APPENDIX K

CLASS 1 IEPA UIC PERMIT

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-2829

PAT QUINN, GOVERNOR JOHN J. KIM, INTERIM DIRECTOR

217/524-3300

November 2, 2011

CERTIFIED MAIL
7009 3410 0002 3751 3988

Archer Daniels Midland Company
Attn: Mark Burau, Decatur Corn Plant Manager
4666 Faries Parkway
Decatur, Illinois 62526

Re: 1150155136 -- Macon County
ADM Company
ILD984791459
Permit No. UIC-012-ADM
Log No. UIC-143-M-3
Well No. CCS #1
UIC Administrative Record File
Permit Approval

Dear Mr. Burau:

Enclosed is an Underground Injection Control (UIC) permit authorizing Archer Daniels Midland Company's ("ADM") to operate of a Class I non-hazardous carbon dioxide sequestration injection well system. This permit (initially issued on December, 23, 2008 and subsequently modified on October 9, 2009 and on March 25, 2011) reflects modifications made based upon information submitted by ADM between May 5, 2010 and October 20, 2011. This modification has been processed as a minor modification pursuant to 35 Ill. Adm. Code 704.264(e)(2). This permit modification addresses the following submittals/reports:

- CCS1 Well Completion Report (the injection well);
- Verification Well #1 Completion Report (a well monitoring the effects of the injection well on the surrounding subsurface);
- Geophone Well Completion Report (a well to collect seismic information associated with the operation of the injection well); and
- Monthly Reporting of Data – Weekly Averages (modifies weekly reporting periods from a period of Monday – Friday to calendar days 1-7, 8-14, etc.).

A detailed list of all documents associated with this permit action is contained in Attachment J of the attached permit. The permit conditions that have been modified in response to the permit modification request are identified in Attachment 1 of this letter.

This permit modification request is hereby approved subject to the conditions contained in the attached UIC permit. Read this document carefully. Failure to meet any portion of the permit could result in civil and/or criminal penalties.

Work required by this letter, your submittal or the regulation may also be subject to other laws governing professional services, such as the Illinois Professional Land Surveyor Act of 1989, the Professional Engineering Practice Act of 1989, the Professional Geologist Licensing Act, and the Structural Engineering Licensing Act of 1989. This letter does not relieve anyone from compliance with these laws and the regulations adopted pursuant to these laws. All work that falls within the scope and definitions of these laws must be performed in compliance with them. The Illinois EPA may refer any discovered violation of these laws to the appropriate regulating authority.

If you have any questions regarding matters related to this permit, please contact Kevin Lesko at 217/524-3271.

Sincerely,

Stephen F. Nightingale, P.E.
Manager, Permit Section
Bureau of Land

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Attachments: Attachment 1 - Scope of Modification
Underground Injection Control Permit

cc: Dean Frommelt, Division Environmental Manager -- ADM
Sallie Greenburg -- Illinois State Geological Survey
Robert Finley -- Illinois State Geological Survey

bcc: UIC Admin Record - 23A
Steve Nightingale
Jim Moore
Terri Blake Myers
Champaign FOS C Jeff Turner
UIC Coordinator U Bur Filson
Kevin Lesko
USEPA Region V - Rebecca L. Harvey

ATTACHMENT 1

SCOPE OF MODIFICATION

Log No. UIC-143-M-3

1150155136 -- Macon County
ADM Company
ILD984791459
Permit No. UIC-012-ADM
Well No. CCS #1

The following is a list of the permit conditions that have been modified in this permit modification request, Log No. UIC-143-M-3. Minor edits for consistency may not be noted.

Condition A.2 – Relocated list of approved application to Attachment J of the permit and referenced new location.

Condition A.3 – New, added information on the specification for the wellhead assembly. Remaining conditions of this section renumbered due to new conditions.

Condition A.4 and A.5 – Condition A.3 and A.4 from previous permit renumbered to Condition A.4 and A.5 due to new Condition A.3. Updated these conditions with as-built information.

Condition A.6 – New, added information on the injection zone and confining layer.

Condition A.7 – Condition A.5 from previous permit renumbered to Condition A.7 due to new Condition A.3 and A.6. Updated to reflect the installation of one Injection Zone Verification Well.

Condition A.8 – Condition A.6 from previous permit renumbered to Condition A.8 due to new Condition A.3 and A.6. Updated to reflect the installation of the Geophone Monitoring Well.

Condition A.9 – New condition requiring submittal of information related to mechanical backup gauges for injection and verification wells.

Condition B.1 – Incorporation of information from Well Completion Report: B.1(a) update of information on the formation fracture pressure parameters; B.1(b) change in injection rates based on capabilities of the flow rate meter (FIT-006); B.1(e) update of in annulus fluid specifications.

Condition B.2 – Incorporation of details on monitoring equipment for the injection well system from the Well Completion Report. B.2(c) update of language clarifying that injection shall not resume until the continuous monitoring system is operational.

Condition B.4 – Incorporation of information on well details including monitoring equipment and specification from Well Completion Report. B.4.(h) clarified information to be included in

geophysical log reports. Identified the location of the mechanical integrity testing procedures in permit application. Clarified that the demonstration of mechanical integrity includes evaluation of the QA Zones. Added language for notification of events occurring with less than thirty days prior notice to the Agency.

Condition B.6 – Removed requirement for submittal of well completion report for the injection well system contained in the previous permit. Condition B.6 is now "Monthly Reporting Requirements." Add a requirement under B.6(b)(vii) that the monitoring chart of the flow rate include notations that identify when the orifice of the flow rate meter was changed and the size orifice that was installed. Added additional information to be submitted for the Verification Well(s).

Renumbered the remaining conditions of Section B to reflect the removal of condition B.6.

Section C – Revised to allow the Permittee to engage in underground injection in accordance with the conditions of the permit.

Condition H.16 – Removed requirement to submit financial assurance documents for the Verification Well and Geophone Monitoring Well as this has been done as of September 2011.

Condition H.17 – Incorporated currently approved cost estimate for plugging and abandonment of the wells under this permit.

Condition H.26 – Clarified information to be included in geophysical log reports (B.26(b)). Identified specific gauges used in daily operations that must be calibrated (H.26(i)). Added language for notification of events occurring with less than thirty days prior notice to the Agency.

Condition H.27 – Removed requirement for submittal of contingency plan. Added requirement to implement contingency plan as approved under this permit. Attachment H as referenced by this condition has been added to the permit.

Condition H.29 – Revised to address regulations that were finalized by US EPA for permitting of underground injection of carbon dioxide for the purpose of geologic sequestration.

Condition H.30 – Removed requirement for submittal of a permit modification application for Corrosion Monitoring Plan; Injection Zone Monitoring Well; Ambient Pressure Monitoring Procedures; Contingency Plan; and the Annulus Protection System.

Condition H.31 – Added condition to address operation of additional injection wells within the Area of Review of CCS#1.

Condition I.3 – Updated to include monitoring wells that have been installed.

Attachment B – Updated to include as-built well diagrams for the injection well including wellhead and packer diagrams, verification monitoring well and geophone monitoring well.

Attachment H – Updated language in Items A.4 and B.4 clarifying that injection shall not resume until the continuous monitoring system is operational. Changed the Verification Well annulus and tubing pressure levels that will result in an automatic shutdown of the injection well system. The previous pressure values were referenced to absolute pressure, now the reference is to gauge pressure which corresponds to the values reported by the actual gauges used.

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ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-2829

PAT QUINN, GOVERNOR JOHN J. KIM, INTERIM DIRECTOR

217/524-3300

Non-Hazardous Class I Well
Underground Injection Control Permit

Archer Daniel Midland Company (ADM)
Attn: Mark Burau, Decatur Corn Plant Manager
4666 Faries Parkway
Decatur, Illinois 62526

Re: 1150155136 -- Macon County
ADM, Company
ILD984791459
Permit No. UIC-012-ADM
Log No. UIC-143-M-3
Well No. CCS #1
UIC Administrative Record File

Issue Date: December 23, 2008
Effective Date: January 27, 2009
Expiration Date: December 23, 2018
Modification Date: November 2, 2011

A modified Underground Injection Well permit is hereby granted pursuant to the Illinois Environmental Protection Act and Title 35 Illinois Administrative Code (Ill. Adm. Code) Parts 702, 704, 705, and 730 to Archer Daniel Midland Company (ADM) to operate and maintain a non-hazardous waste Class I Underground Injection Control (UIC) well, known as Carbon Capture Sequestration Well No. 1 (CCS1), for the injection of supercritical carbon dioxide. The permitted well is located 438 feet South and 1332 feet East of the Northwest corner of the Northwest quarter of Section 5, Township 16 North, Range 3 East, Macon County, Illinois.

This permit consists of the conditions contained herein (including those in any attachments and appendices) and applicable regulations contained in the Illinois Environmental Protection Act and Title 35 Ill. Adm. Code Parts 702, 704, 705 and 730. The Environmental Protection Act 415 ILCS 5/1 et seq. (formerly Ill. Rev. Stat., Chapter 111 1/2, Section 1039) grants the Illinois Environmental Protection Agency the authority to impose conditions on permits which it issues.

This permit is issued based on the information submitted in the permit application identified in Attachment J, and any subsequent amendments (hereafter referred to as the approved permit application). Any inaccuracies found in this information may be grounds for the termination of modification of this permit (see 35 Ill. Adm. Code 702.187 and 702.186) and potential enforcement action.

If you have any questions regarding this permit, please contact Kevin Lesko at 217/524-3271.

Sincerely,

Stephen F. Nightingale, P.E.
Manager, Permit Section
Bureau of Land

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KL
JCM

4302 N. Main St., Rockford, IL 61103 (815)987-7760
595 S. State, Elgin, IL 60123 (847)608-3131
2125 S. First St., Champaign, IL 61820 (217)278-5800
2009 Mall St., Collinsville, IL 62234 (618)346-5120

9511 Harrison St., Des Plaines, IL 60016 (847)294-4000
5407 N. University St., Arbor 113, Peoria, IL 61614 (309)693-5462
2309 W. Main St., Suite 116, Marion, IL 62959 (618)993-7200
100 W. Randolph, Suite 11-300, Chicago, IL 60601 (312)814-6026

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A. WELL SPECIFICATIONS

1. Well Location. Carbon Capture Sequestration Well 1 (CCS1) is located 438 feet South and 1332 East of the Northwest corner of the Northwest quarter of Section 5, Township 16N, Range 3E, Macon County, Illinois. The surface elevation is 674 feet above mean sea level (MSL). The approximate completed depth of the well is at 7,221 feet or 6,547 feet below MSL, extending approximately 185 feet into the Precambrian granite.

2. Application and Plans. Construction and operation of the injection well and associated monitoring systems, shall be conducted in accordance with the terms and conditions of this permit, the approved permit application, and subsequent approved modifications as identified in Attachment J.

3. Wellhead. The wellhead assembly shall be rated to a minimum of 3,000 psi working pressure. Components of the wellhead that are in contact with the injection stream shall be constructed of schedule 310 or 410 stainless steel. A wellhead assembly diagram is provided in Attachment B of this permit.

4. Casing and Cementing (35 Ill. Adm. Code 730.112(b)). An injection well diagram is provided in Attachment B of this permit. The casing and cement design specifications used in the construction of the well are as follows:

   a. Surface Casing (Carbon steel, Grade H-40, OD (outer diameter) 20 in.) The surface casing was set and cemented at a subsurface depth of 340 feet. Cementing was accomplished in two sections; (Lead) Class A, 58 cubic yards (c.y.) and (Tail) Class A 38.67 c.y.

   b. Intermediate Casing (Carbon steel, Grade J-55, OD 13.375 in.). The intermediate casing was set and cemented at a subsurface depth of 5324 feet. Cementing was completed in two stages with the first stage using a Class H cement and the second stage using a 65/35 Class A Pozzolan system with 4% bentonite and 10% salt with 5 lbs/sack Kolite mix.

   c. Long string Casing (Top Section; Carbon steel, Grade N-80, OD 9.625 in.) (Bottom Section; Carbon steel, Grade L-80, and Chrome steel, 13Cr80, OD 9.625 in.) The longstring casing was set and cemented at a subsurface depth of 7219 feet. Cementing was completed in two sections: lead section from 0-4170 ft. (35/65 LP3:A, pozzolan/cement blend), and a tail section from 4170-7219 ft. (EverCRETE).

5. Tubing and Packer Specifications. Injection shall be through the 4-1/2 inch OD, 12.6 ppf, 13CR85 tubing and packer assembly. The tubing extends from the wellhead to 6348 feet below ground surface and attaches to the packer assembly. The packer is a

Schlumberger brand Quantum Max Type III Service Tool, Q-Max 13 Chrome. The top of the packer is set at depth of 6348.7 feet with the center of the sealing elements at 6350 feet. The end of the packer assembly is at 6399 feet below ground surface. Any changes in the tubing and packer material and design shall be submitted to the Permit Section, Division of Land Pollution Control for approval at least 30 days prior to installation. (35 Ill. Adm. Code 730.112(c))

6. Injection and Confining Layers. Carbon dioxide will be injected into the Mt. Simon sandstone formation. The Mt. Simon formation is a saline brine aquifer that is present from approximately 5,530 to 7,036 feet below ground surface at the well site. Carbon dioxide will be injected into this formation through perforations in the long string casing that are located at 6,962 – 6,963 feet below ground surface; 6,967 – 6,997 feet below ground surface; and 7,010.5 – 7,035.5 feet below ground surface.

   Above the Mt. Simon formation is the Eau Claire formation that is present from approximately 5,032 to 5,530 feet below ground surface at the well site. The Eau Claire formation serves as the confining layer for the carbon dioxide that is injected into the lower Mt. Simon formation. The Eau Claire formation is made up of shale, and is approximately 498 feet thick at the injection well site.

7. Injection Zone Verification Wells. The injection zone verification well allows for the monitoring of formation fluids at various levels within the injection zone, and within the Potosi and Ironton aquifers present immediately above the Eau Claire confining layer. This allows monitoring of the chemical composition, pressure and temperature of the formation fluids within multiple formations.

   a. The Permittee has installed one injection zone verification well located approximately 1045 feet north of the injection well in accordance with the Well Completion Report submitted and approved in this permit modification, Log# UIC-143-M-3, identified in Attachment J.

   b. The Permittee may install one additional injection zone verification well ("Verification Wells") in accordance with the plans, specifications and methods descried the permit modification application, Log # UIC143-M-2, identified in Attachment J. The Verification Well shall be located within the area identified in Part 2, Figure 1 (page 7 of 44) of the permit modification application, Log # UIC143-M-2.

8. Geophone Monitoring Well. The Permittee has installed a Geophone Monitoring Well in accordance with the Well Completion Report submitted and approved in this permit modification, Log # UIC143-M-3, identified in Attachment J. This monitoring well allows for the collection of data from the subsurface, near the injection well, when seismic surveys are conducted.

9. Mechanical Gauges for Injection and Verification Wells. Mechanical gauges located on the injection and verification wellheads shall be read to provide continuous monitoring in the event of a power outage that affects the ability of each well's electronic gauges to gather and report data. Within 30 days of issuance of this permit, the Permittee shall provide a report identifying the location, ADM tag number, manufacturer name, model, and specifications for the mechanical gauges already present at each well that will read in place of the electronic gauges identified below:

   a. Mechanical backup gauges for the following electronic gauges located on the Injection Well shall be provided:

      i. Injection pressure gauge – Surface injection pressure gauge – PIT-009, and

      ii. Annular pressure gauge – PIT-014

   b. Mechanical backup gauges for the following electronic gauges located on the Verification Well shall be provided:

      i. Surface pressure gauge for Westbay tubing string – PIT-201, and

      ii. Annular pressure gauge – PIT-202.

   The gauges must be able to display events which exceed maximum permitted and minimum operating parameters by a minimum of 20%. Each gauge shall have an appropriate scale that will allow readings to be discerned at the lower and higher end of the operational limits required by the permit.

   The Permittee shall also include in the above report a revised Attachment I, "Field Log – Injection/Verification Wells" of this permit to include provisions for recording readings of the backup mechanical gauges when necessary.

B. OPERATING, MONITORING AND REPORTING REQUIREMENTS

1. Injection Well Operating Requirements (35 Ill. Adm. Code 730.113(a), 704.185)

   a. Maximum injection pressure. The maximum injection pressure as measured at the wellhead shall be 1,950 psig. If the pressure at the wellhead reaches 1,950 psig, the injection well shall automatically be shut in. The Mt. Simon formation fracture pressure at 7,010 ft. was determined to be 5,024 psi, resulting in a fracture gradient of 0.715 psi per foot. The maximum wellhead injection pressure of 1950 psig is approximately 75% of the pressure that would cause fracturing within the injection zone. Thus, the injection of carbon dioxide into the injection zone will not cause any fracturing of that zone.

b. Injection rate. The injection rate limits are based on the capabilities of the flow rate meter (FIT-006). The maximum injection rate shall be limited to 80% of the maximum capability of the continuous recording device as required by Condition B.2(d). The injection rate shall be within the limits indicated below.

FIT-006 Orifice Size	Flow Rate Limit (min/max)
1.5 inch	13,009 – 40,509 lbs/hr
1.75 inch	19,519 – 55,859 lbs/hr
2.5 inch	31,069 – 96,672.8 lbs/hr

The flow rate limits above apply to the injection of carbon dioxide except during startup, testing and shutdown periods. The Permittee shall report changes to the flow rate meter FIT-006 in accordance with Condition B.7(c).

c. Maximum injection mass. The maximum daily injection shall not exceed 1,200 metric tonnes/day. The maximum total amount of supercritical carbon dioxide that may be injected under this permit is 1.0 million metric tonnes.

d. Injection Fluid Parameters. The injected carbon dioxide shall be within the limits indicated below during injection.

Parameters	Limits
Temperature*	60 - 150°F
Phase**	Supercritical

* - As measured near the wellhead.
** - At the point of injection.

The limits above for temperature and the phase of the injection fluid apply to the injection of carbon dioxide except during startup, testing and shutdown periods. Other fluids may be injected for short periods for purposes of well testing, well stimulation and for the purposes of formation testing. The Permittee shall provide notice to the Illinois EPA of these tests in accordance with Condition H.26(e).

e. Annulus Protection. The following procedures will be used to limit the potential for any unpermitted fluid movement into or out of the annulus:

i. The annulus between the tubing and the long string casing is filled with 9.4 lb/gal sodium-chloride brine with corrosion inhibitor and oxygen scavenger additives. The annular fluid will have a specific gravity of 1.104 and a hydrostatic coefficient of 0.478 psi per foot.

ii. The annulus will be kept at a minimum of 400 pounds per square inch (psi) at all times as measured at the wellhead.

iii. The pressure within the annular space, over the interval above the packer to the bottom of the confining layer, shall be greater than the pressure of the injection zone formation at all times.

iv. Any changes to the composition of annular fluid shall be reported in the next monthly report submitted to the Permit Section, Division of Land Pollution Control.

v. A pressure differential of at least 100 psi between the tubing and annular space, from the packer to the bottom of the confining layer, shall be maintained during injection of fluid.

f. Annulus injection prohibition. Injection between the outer most casing protecting underground sources of drinking water and the well bore is prohibited.

g. Prohibition of excessive pressure. The Permittee shall not use excessive injection pressure or volumes and cause:

i. new fractures or propagation of existing fractures in the injection zone,

ii. initiation of fractures in the confining zone,

iii. migration of injected fluids into any underground source of drinking water,

iv. displacement of formation fluid into any underground source of drinking water, or

v. non-compliance with 35 Ill. Adm. Code 730 operating requirements.

2. Monitoring Requirements for the Injection Well (35 Ill. Adm. Code 730.113(b))

a. Sampling. Grab samples of the injection fluid shall be collected in accordance with Condition B.3.

b. Continuous recording devices. The following continuous recording devices or their equivalents shall be installed and used to monitor the injection pressure, flow rate, temperature, and annulus pressure:

i. Injection pressure gauges – Surface injection pressure gauge – PIT-009, ABB/264HSVKTA1, 0-2440 (psig), continuous recording

ii. Annular pressure gauge – PIT-014, ABB/ 624EGS21030G811, 0-1000 (psig), continuous recording

iii. Flow meter – FIT-006, SCADASense/4203 (with an orifice size of 1.5, 1.75, or 2.25 inches), 13,009-96,672.8 (lb/hr), continuous recording

iv. Temperature gauges – Surface temperature gauge- TIT-009, Rosemount, 3144PD1A1E5M5Q4XA 0-180 (degF), continuous recording

c. In the event of a failure of the continuous monitoring system, injection into the injection well shall cease and manual field readings shall be obtained from the gauges identified in Attachment I, "Field Log – Injection/Verification Wells", of this permit. The manual reading shall be recorded on the "Field Log – Injection/Verification Wells." The initial readings shall be obtained within 30 minutes of the failure and every four (4) hours afterword until the continuous monitoring system is restored. Copies of the log(s) and a report regarding the maintenance performed to correct the failure shall be provided with the monthly report as required in Condition B.6. Injection shall not resume until such time as all components of the continuous monitoring system are operating properly.

d. Recording device ranges. All recording devices must be able to record events which exceed maximum permitted operating parameters by a minimum of 20%.

e. Corrosion Monitoring. The Permittee shall implement the corrosion monitoring system for the injection well in accordance with the plans, specifications and methods described in the permit modification application, Log # UIC143-M-2, identified in Attachment J.

3. Material Analysis Plan (35 IAC 704.187). The Permittee shall follow the written Material Analysis Plan, Appendix F of the permit application, as modified by this permit. A copy of the plan shall be kept at the facility. The Permittee shall collect and analyze the injection fluid in a manner consistent with US EPA publication SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods".

The Permittee may make a written request for changes in sample collection methods; remove analytical constituents from the list of parameters to be analyzed; or request that the frequency of analysis for individual parameters be reduced. The request must include a demonstration that the change will not affect the characterization of the injection fluid which is necessary to ensure that the injection fluid can be safely injected in accordance with other requirements of this permit. Changes to the Material Analysis plan shall not be done without written authorization from the Illinois EPA.

4. Injection Zone Verification Wells Operating Requirements.

   a. Notification Requirements. The Permittee shall comply with the notification requirements of Condition H.14, if at any time the Permittee becomes aware of information which indicates that the Verification Wells, identified in Condition A.7, may endanger health, the environment, or an underground source of drinking water.

   b. Verification Well Annulus Protection. The following procedures will be used to limit the potential for any unpermitted fluid movement into or out of the annuli:

      i. The upper annulus between the Westbay tubing and the long string of casing and above the uppermost packer (Packer 28) located at 4,823.8 feet below ground surface is filled with 9.4 ppg NaCl brine with Nalco Adomite ASP 539D corrosion inhibitor at a concentration of 2 gallons per 1000 gallons brine. The annular fluid will have a specific gravity of 1.127 and a hydrostatic coefficient of 0.488 psi per foot.

      ii. The upper annulus shall be kept full at all times.

      iii. The interior of the Westbay tubing string shall be kept full at all times with fluid as described in item b(i).

      iv. Additions or removal of annulus fluid shall be recorded and reported as required by Condition B.7.

      v. Any changes to the composition of annular fluid shall be reported in the next monthly report submitted to the Permit Section, Division of Land Pollution Control.

      vi. The QA Zone, located within the confining layer between Packer 18 and Packer 19, which extends from 5,456.6 to 5,502.4 feet below ground surface, shall be filled with 9.4 ppg NaCl brine with Nalco Adomite ASP 539D and continuously monitored for pressure and temperature.

   c. Continuous recording devices. The following continuous recording devices for the Verification Well or their equivalent shall be installed:

      i. Surface pressure gauge for Westbay tubing string – PIT-201, ABB/266GSH-U, -14.7 to 435 psig, continuous recording

      ii. Annular pressure gauge – ABB/266GSH-U – PIT-202, -14.7 to 435 psig, continuous recording

iii. Down hole pressure and temperature gauges for Westbay monitoring system – Westbay MOSDAX/2580, 0-5000 (psig) and 32-158 (degF), continuous recording. The gauges are located within the Westbay tubing string at the following depths:

Port Name	Depth (ft. below ground surface)
Port 1	7045
Port 2	6967.4
Port 3	6930
Port 4	6822.3
Port 5	6704.7
Port 6	6616.7
Port 7	6400.6
Port 8	5824.8
Port 9	5638.3
QA Zone	5467
Port 10	4986.1
Port 11	4902

d. In the event of a failure of the continuous monitoring system, injection into the injection well shall cease and manual field readings shall be obtained from the gauges identified in Attachment I, "Field Log – Injection/Verification Wells", of this permit. The manual reading shall be recorded on the "Field Log – Injection/Verification Wells." The initial readings shall be obtained within 30 minutes of the failure and every four (4) hours afterword until the continuous monitoring system is restored. Copies of the log(s) and a report regarding the maintenance performed to correct the failure shall be provided with the monthly report as required in Condition B.6.

e. Recording device ranges. All recording devices must be able to record events which exceed maximum permitted operating parameters by a minimum of 20%.

f. Test and Logs During Construction. During drilling and construction of any additional Verification Well, all test and logs listed under 35 Ill. Adm. Code 730.112(d) shall be performed and all results shall be submitted to the Agency. The Permittee shall also determine the hydrostatic gradient, static fluid levels, porosity of the formation and total dissolved solids of the formation fluids of each of the geologic formations that will be monitored by this well.

g. Verification Well Completion Report. The Permittee shall submit a Verification Well Completion Report (Attachment E) within 120 days of completion of any new Verification Well. The report should include a description of construction, including driller's log, materials used (i.e., tubing and casing tallies), cement (and other) volumes, appropriate logs and other tests conducted during the drilling and

construction. The report should also include an as-built well schematic or other appropriate drawing of surface and subsurface construction details, and a facility map on a scale of one inch equal to not greater than 200 feet identifying the location of the geophone monitoring well, the injection well, facility boundaries and other appropriate structures.

h. Duty to Establish and Maintain Mechanical Integrity for a Verification Well (35 Ill. Adm. Code 704.181(h) and 704.190) The procedures for the mechanical integrity testing shall be conducted in accordance with the conditions of this permit and the procedures located in the permit modification application, Log # UIC143-M-2, "Part 2, Verification Well Modifications," Section III. "Mechanical Integrity Tests During the Service Life of the Well," page 27a of 44.

   i. The Permittee shall establish and thereafter maintain mechanical integrity as defined in 35 Ill. Adm. Code 730.108.

   ii. A demonstration of mechanical integrity in accordance with the procedures of permit modification application, Log # UIC143-M-2, shall be conducted to ensure the well has integrity during the life of this permit.

   A report interpreting the results of the demonstration of mechanical integrity, including a descriptive report of all geophysical logs, prepared by a qualified log analyst, shall be submitted with log analyses to the Permit Section, Division of Land Pollution Control. This report shall be signed by the analyst and shall include his/her phone number.

   The descriptive report should also discuss: (1) changes in the structure of the well detected by the geophysical logging; (2) the location of defects; (3) any additional monitoring or corrective action that may be needed to assure the integrity of the well; and (4) an evaluation of the impact any defect may have on the integrity of the well and its ability to contain the injectate and protect USDWs over its operating life.

   iii. During periods when the Westbay automated data logging system is removed from the Verification Well, manual measurements for fluid pressures and temperatures from all monitoring zones shall be obtained within 2 weeks of removal and every two (2) weeks thereafter until the automated data logging system is restored to operation.

   iv. The Permittee shall not remove the Westbay automated data logging system for planned events, unless the well has maintained adequate mechanical integrity for the prior 30 days. This condition does not prohibit removal in order to repair components of the system that are

required to demonstrate mechanical integrity of the system or in order to restore the mechanical integrity of the Verification Well.

v. Annually the Permittee shall prepare a report on all events that required the removal of the Westbay automated logging system from the Verification Well. This report shall include:

a. Reason for removal of system;
b. Length of time that the system was removed;
c. Discussion of well integrity testing/measurements during this period; and
d. Identification and discussion of resolution of any problems encountered.

This report shall be submitted to the Permit Section, Division of Land Pollution Control on January 15 of each year.

vi. The Permittee shall demonstrate the absence of significant leaks in the upper annulus system which consists of the annulus casing above the uppermost packer (Packer 28), Westbay tubing and Westbay upper packer. A demonstration of the absence of significant leaks shall also be made for the interior of the Westbay tubing through out its entire length. The upper annulus pressure test shall be performed at a minimum annually or anytime the upper packer is unseated. The pressure test of the interior of the Westbay tubing and evaluation of the QA Zones shall be performed at a minimum annually or anytime the Westbay automated data logging system is re-installed in the Verification Well. These tests shall be conducted in accordance with the permit modification application, Log # UIC143-M-2, USEPA Region V guidance Determination Of The Mechanical Integrity Of Injection Wells – Attachment 1 (Revised June 11, 1998), and the following conditions:

a. The annular space and interior of the Westbay tubing must be completely filled with fluid.

b. The pressure tests of the annulus and the interior of the Westbay tubing shall be conducted independently.

c. When pressure testing the upper annular space and casing a positive pressure differential between the annular space and the interior of the Westbay tubing of at least 100 psi shall be maintained throughout the entire annulus above the uppermost Westbay packer (Packer 28).

d. When pressure testing the interior of the Westbay tubing a pressure differential of at least 100 psi shall be maintained between the interior of the tubing and the pressure on the exterior of the tubing throughout its entire length.

e. Measurements of pressure should be taken at a minimum of every ten minutes.

f. The well will be deemed to have failed the pressure test if a pressure change of greater than 3% occurs over a one hour period.

vii. The Permittee shall demonstrate the absence of significant fluid movement into an underground source of drinking water through vertical channels adjacent to the well bore by use of a temperature survey and a time-lapse sigma log (oxygen activation log). These tests shall be run biannually (every 24 months) in accordance with the procedures of this permit and permit modification application, Log # UIC143-M-2.

viii. The Permittee will inform the Permit Section, Division of Land Pollution Control, of its intent to conduct pressure test(s), and temperature log(s), plus any additional mechanical tests, logs, or inspections, at least thirty (30) days prior to the demonstration of mechanical integrity. The notice must include the type of test to be conducted.

Should the Permittee not be able to provide the Agency with thirty (30) days advanced notice due to unexpected events, the Permittee shall provide notification within twenty-four (24) hours of the Permittee becoming aware of the need to conduct one or more of the test, logs or inspections identified above. This twenty-four (24) hour notification shall be provided via email and\or telephone to:

Champaign Field Operations Section
E-mail: Jeff.Turner@Illinois.gov
Phone Number: 217-278-5822

Division of Land Pollution Control Permit Section
E-mail: Kevin.Lesko@Illinois.gov
Phone Number: 217-524-3271

A written submission shall also be provided to the Permit Section, Division of Land Pollution Control, within 5 days. The written submission shall contain:

a. The nature of the work to be done;

b. The reason that the work is required to be conducted without providing thirty (30) days notice; and

c. A tentative schedule of work to be performed, including an estimate of when required testing may be performed.

ix. A cement bond log must be run in the entire length of the long string casing whenever the Westbay tubing and packer system is removed from the well. If the Westbay tubing is removed more than once in a five year period, only one cement bond log shall be required.

x. An electromagnetic casing inspection log shall be run to determine the thickness, external condition, and internal condition of the long string casing for its entire length. This log shall be run when the Westbay tubing and packer system is removed from the well for the cement bond log. If the tubing is removed more than once in a five year period, only one electromagnetic log shall be required.

xi. The Permittee shall cease injection if an apparent loss of mechanical integrity as defined by 35 Ill. Adm. Code 730.108, becomes evident during operation or at the time of the mechanical integrity demonstration. Operation shall not be resumed until the Permittee has complied with the provisions of this permit, and applicable regulations, regarding mechanical integrity demonstration and testing.

xii. All gauges used in mechanical integrity demonstrations or in daily operations shall be calibrated according to the procedures of the National Bureau of Standards, initially and at least annually thereafter. A copy of the calibration certificate shall be submitted to the Permit Section, Division of Land Pollution Control on January 15 of each year. In addition, recording devices are to be time synchronized at least quarterly.

xiii. In addition to the mechanical integrity demonstration required by this permit, the Illinois EPA has the authority to require the Permittee to conduct a demonstration of mechanical integrity of the well at any time well operations, or other information, leads the Illinois EPA to decide an additional mechanical integrity demonstration is necessary. The notice requiring the mechanical integrity demonstration shall be in writing and contain justification for requiring the additional testing.

i. The Permittee shall notify the Illinois EPA ninety (90) days prior to the planned installation of the second Verification Well. This notification shall include the location of the well. The Permittee shall also provide a demonstration of adequate financial resource in accordance with condition H.16 for plugging and

abandonment of the well prior to beginning construction of the well. The Illinois EPA will issue written authorization for the installation of the injection zone monitoring wells.

j. Inactive Wells. (35 Ill. Adm. Code 704.188) After cessation of the monitoring program associated with a Verification Well for a period of two (2) years, the Permittee shall plug and abandon the well in accordance with Condition H.23 of this permit, unless the Permittee has:

   i. Provided notice to the Permit Section, Division of Land Pollution Control; and

   ii. Described actions or procedures, which are deemed satisfactory by the Illinois EPA, to ensure the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells, including mechanical integrity testing, unless waived by the Illinois EPA in writing.

k. Financial Assurance. The Permittee shall maintain financial responsibility and resources in accordance with Condition H.16, to close, plug, and abandon the Verification Well in accordance with the Plugging and Abandonment plan contained in the permit modification application, Log # UIC143-M-2, identified in Condition A.2.

   The cost estimate to close, plug and abandon a Verification Well is $318,000 (2009 dollars).

5. Ambient Monitoring (35 Ill. Adm. Code 730.113(d)) The Permittee shall conduct an Ambient Pressure Monitoring Test annually. The Ambient Pressure Monitoring Test shall be conducted as described in Part 1, page 17 of the permit modification application, Log # UIC143-M-2, identified in Attachment J.

6. Monthly Reporting Requirements

   References to "well" also include reporting on the Verification Well(s) as well as the injection well.

   a. Report submittal date. Monthly monitoring reports are due by the 15th day of the month immediately following a reporting period. A reporting period is defined as a calendar month. The reporting period for the daily values is defined as the period from 6:00 a.m. to 5:59:59 a.m.

b. Contents of monthly reports for the Injection Well. The monthly reports shall include:

i. Daily value for total mass and daily maximum and minimum values for annulus pressure, injection pressure, and flow rate.

ii. Weekly averages for annulus pressure, injection pressure and flow rate using the procedure in Attachment C.

iii. The number of times the injection well is started up during each day

iv. Total hours of injection each day

v. Total mass injected to date

vi. Monthly summary of:

(a) maximum, minimum, and average values for annulus pressure, injection pressure, and flow rate, using the procedure in Attachment C

(b) total mass injected

(c) total number of injection well startups

vii. A copy of the operating charts for the month for:

(a) annulus pressure

(b) injection pressure

(c) flow rate (including notations that identify when the orifice of the flow rate meter was changed and the size orifice that was installed)

If the data is collected electronically, operating chart(s) shall be generated from the electronic data. The charts generated shall be an accurate representation of the electronic data and provide enough resolution to represent the condition of the well during operation. The Agency reserves the right to require submittal of tabular paper copies of the data, changes in the format and resolution of the representative graph(s), and the submittal of the electronic data to Field Operations Staff and Permit Section Staff for review. The electronic data submitted must be in a format that is useable to said staff, such as tab or comma delimited CVS format or Microsoft Excel format.

viii. Results of chemical analyses required by this permit.

c. Contents of monthly reports for the Verification Well(s). The information in the monthly report describe below does not include all of the data that is recorded for the Verification Well. The Agency reserves the right to require submittal of additional information/data that is collected for the verification well. The monthly reports shall include:

i. Daily maximum and minimum values for annulus pressure (gauge PIT-202), Westbay tubing string pressure (gauge PIT-201), Westbay Port 9 formation pressure, Westbay Port 10 formation pressure and QA Zone pressure and temperature.

ii. Weekly averages for annulus pressure, Westbay tubing string pressure, Westbay Port 9 formation pressure, Westbay Port 10 formation pressure and QA Zone pressure and temperature, using the procedure in Attachment C.

iii. Monthly summary of:

(a) maximum, minimum, and average values for annulus pressure, Westbay tubing string pressure, Westbay Port 9 formation pressure, Westbay Port 10 formation pressure and QA Zone pressure and temperature, using the procedure in Attachment C

iv. A copy of the operating charts for the month for:

(a) Verification Well annulus pressure

(b) Westbay tubing string pressure

(c) Westbay Port 9 formation pressure

(d) QA Zone pressure

(e) QA Zone temperature

(f) Westbay Port 10 formation pressure

If the data is collected electronically, operating chart(s) shall be generated from the electronic data. The charts generated shall be an accurate representation of the electronic data and provide enough resolution to represent the condition of the well during operation. The Agency reserves the right to require submittal of tabular paper copies of the data, changes in the format and resolution of the representative graph(s), and the submittal of

the electronic data to Field Operations Staff and Permit Section Staff for review. The electronic data submitted must be in a format that is useable to said staff, such as tab or comma delimited CVS format or Microsoft Excel format.

v. Results of chemical analyses required by this permit.

d. Other information in monthly reports. The results of any of the following tests or work shall be reported with the second monthly report after completion of the test or work:

i. Periodic tests of mechanical integrity.

ii. Copies of any logs run on a well, submitted with a log analysis prepared by a qualified log analyst.

iii. Any other test conducted on a well by the Permittee.

iv. Any well work over.

v. Maintenance performed on monitoring devices or well components.

vi. Changes of gauges, pipes, and other well components and monitoring devices.

vii. Changes in the type of annulus fluid.

viii. Addition or removal of annulus fluids.

ix. Summary of annular fluid level fluctuations.

x. Ambient pressure monitoring results.

e. Illegible reports will be returned to the Permittee and deemed not filed. All graphs and charts will be labeled appropriately.

f. Report submittal addresses. The cover letter for the monthly report will indicate a copy of the report was submitted to each of the following addresses:

i. Illinois Environmental Protection Agency
Division of Land Pollution Control - #33
Permit Section
1021 N. Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

ii. Illinois Environmental Protection Agency
Division of Land Pollution Control
Field Operations Section
2125 South 1st Street
Champaign, Illinois 61820

7. Geophone Monitoring Well Requirements

a. Notification Requirements. The Permittee shall comply with the notification requirements of Condition H.14, if at any time the Permittee becomes aware of information which indicates that the Geophone Monitoring Well may endanger health, the environment, or an underground source of drinking water.

b. Financial Assurance. The Permittee shall maintain financial responsibility and resources in accordance with Condition H.16, to close, plug, and abandon the Geophone Monitoring Well in accordance with the Well Abandonment plan contained in the August 25, 2009 permit modification application, Log # UIC143-M-1, identified in Attachment J.

The cost estimate for the Geophone well is $83,000 (2008 dollars), as provided in the written cost estimate dated, January 5, 2011.

C. **EFFECT OF PERMIT.** The existence of a UIC permit shall not constitute a defense to a violation of the Environmental Protection Act or 35 Ill. Adm. Code Subtitle G except for development, modification or operation without a permit. A permit may be modified or revoked during its term for cause set forth in 35 Ill. Adm. Code 702.183 through 702.186. (35 Ill. Adm. Code 702.181)

The Permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The underground injection activity authorized by this permit shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons or the environment. Any underground injection activity not authorized in this permit or otherwise authorized by permit is prohibited. (35 Ill. Adm. Code 704.122)

Compliance with the terms of this permit does not constitute a defense to any action brought under Section 1431 of the Safe Drinking Water Act (SDWA) or any other law governing protection of public health or the environment for any imminent and substantial endangerment to human health, or the environment. In the case of disagreement between the conditions of this permit and the application, the permit conditions shall govern.

D. PERMIT ACTIONS. The filing of a request by the Permittee for a permit modification or revocation, or a notification of planned changes or anticipated noncompliance, does not stay the applicability or enforceability of any permit condition. (35 Ill. Adm. Code 702.146)

E. SEVERABILITY. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit is held invalid, the application of such provision to other circumstances and to the remaining provisions of this permit shall not be affected thereby.

F. CONFIDENTIALITY. In accordance with Section 7 of the Environmental Protection Act, certain information submitted to the Illinois EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, Illinois EPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with Illinois Pollution Control Board and Illinois Environmental Protection Agency procedures. Claims of confidentiality for the following information will be denied:

1. The name and address of the Permittee;

2. Information, which deals with the existence, absence or level of contaminants in drinking water.

G. PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS. Any person who violates a permit requirement is subject to civil penalties, fines, and other enforcement action under the Safe Drinking Water Act (SDWA) and the Environmental Protection Act.

H. DUTIES AND REQUIREMENTS.

1. Duty to Comply. The Permittee shall comply with all applicable Underground Injection Control (UIC) program regulations and conditions of this permit, except to the extent and for the duration such noncompliance is authorized by a temporary emergency permit under 35 Ill. Adm. Code 704.163. Any permit noncompliance constitutes a violation of the Illinois Environmental Protection Act and is grounds for enforcement action, permit revocation, modification, or denial of a permit renewal application. Such noncompliance may also be grounds for enforcement action under

the Resource Conservation and Recovery Act (RCRA). (35 Ill. Adm. Code 702.141 and 35 Ill. Adm. Code 704.181(a)).

2. Duty to Reapply. If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee will submit an application for a new permit at least 180 days before this permit expires. (35 Ill. Adm. Code 702.142)

3. Need to Halt or Reduce Activity. It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. (35 Ill. Adm. Code 702.143)

4. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from non-compliance with this permit. (35 Ill. Adm. Code 702.144)

5. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities, systems of treatment, and controls (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, adequate laboratory and process controls, and appropriate quality assurance procedures. This provision requires the operation of backups, auxiliary facilities, or similar systems used only when necessary to achieve compliance with the condition of the permit. (35 Ill. Adm. Code 702.145)

6. Property Rights. Issuance of this permit does not convey any property rights of any sort, or any exclusive privilege. (35 Ill. Adm. Code 702.147)

7. Duty to Provide Information. The Permittee shall furnish to the Illinois EPA, within the specified times, any information which the Illinois EPA may request, to determine whether cause exists for modifying, revoking and reissuing, terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Illinois EPA, upon request, copies of records required to be kept by this permit. (35 Ill. Adm. Code 702.148)

8. Inspection and Entry (35 Ill. Adm. Code 702.149). The Permittee shall allow an authorized representative of the Illinois EPA, upon the presentation of credentials and other documents, as may be required by law, and at reasonable times, to:

    a. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy any records that must be kept under the conditions of this permit;

c. Inspect any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor for the purposes of assuring permit compliance or as otherwise authorized by the appropriate Act, any substances or parameters at any location.

e. Have access to witness the running of any logs or tests.

9. Monitoring. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (35 Ill. Adm. Code 702.150(a))

10. Records (35 Ill. Adm. Code 702.150(b),(c) & 704.181(b))

a. The Permittee shall retain records of all monitoring information, including all calibration, maintenance records, original chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of the Illinois EPA at any time.

b. Retention of records. The Permittee shall retain records concerning the nature and composition of all injected fluids until three years after the completion of any plugging and abandonment procedures specified under 35 Ill. Adm. Code 704.188. The Owner or Operator shall continue to retain the records after the three year retention period unless the Owner or Operator delivers the records to the Illinois EPA or obtains written approval from the Illinois EPA to discard the records.

c. Records of monitoring information shall include:

i. The date, exact place, and time of sampling or measurements;

ii. The individual(s) who performed the sampling or measurements;

iii. A precise description sampling methodology and handling;

iv. The date(s) analyses were performed;

v. The individual(s) who performed the analyses;

vi. The analytical techniques or methods used; and

vii. The results of such analyses; and

viii. Chain of custody procedures.

11. Signatory Requirements. All reports, or information submitted to the Illinois EPA shall be signed and certified as required in 35 Ill. Adm. Code 702.126. (35 Ill. Adm. Code 702.151)

12. Reporting Requirements.

    a. Planned changes. The Permittee shall give written notice to the Permit Section, Division of Land Pollution Control within 15 days of any planned physical alterations or additions as to the permitted facility. (35 Ill. Adm. Code 702.152(a))

    b. Anticipated noncompliance. The Permittee shall give advance notice to the Permit Section, Division of Land Pollution Control, of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. (35 Ill. Adm. Code 702.152(b)).

    c. Other noncompliance. The Permittee shall report all instances of noncompliance not reported under 35 Ill. Adm. Code 702.152 paragraphs (d), (e) and (f) at the time monitoring reports are submitted. The reports shall contain the information referenced in 35 Ill. Adm. Code 702.152 Subsection (f). (35 Ill. Adm. Code 702.152(g))

    d. A summary of the reporting dates can be found in Attachment D for information required by this permit. This summary is provided as a convenience and is not necessarily complete, nor is it to be construed as a substitute for actual permit conditions.

13. Corrective Action Requirements (35 Ill. Adm. Code 704.193)

    a. The permitted well shall be immediately shut-in and the Permit Section, Division of Land Pollution Control, shall be notified if:

        i. upward fluid migration occurs through the well bore of any previously unknown, improperly plugged or other wells due to injection of fluid and/or

        ii. any problems developed with the casing or components of the injection well or monitoring Verification Well(s).

b. Any improperly plugged or unplugged wells will be plugged and abandoned immediately. A copy of the plugging affidavit(s) filed with the Illinois Department of Public Health and the Illinois Department of Natural Resources, Office of Mines and Minerals, Division of Oil and Gas must be submitted to the Permit Section, Division of Land Pollution Control.

c. Telephone notification within twenty-four (24) hours of the discovery of the problem and written confirmation transmitted by letter within five (5) days.

d. In case of a well failure, the Permittee shall implement the contingency plan developed for the injection well and/or monitoring Verification Well(s). An investigation of the indicated well failure and plan of action to eliminate the problem must be conducted and the remedial work performed.

14. Twenty-four Hour Reporting. (35 Ill. Adm. Code 702.152(f))

a. The Permittee shall report to the Permit Section, Division of Land Pollution Control, any noncompliance or well activity which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances.

b. A written submission shall also be provided to the Permit Section, Division of Land Pollution Control, within 5 days of the time the Permittee becomes aware of the circumstances. The written submission shall contain:

i. a description of the noncompliance problem and its cause;

ii. the period of noncompliance including exact dates and times;

iii. if the noncompliance problem has not been corrected, the anticipated time it is expected to continue; and

iv. steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance problem.

c. The following shall be included as information which must be reported within 24 hours (35 Ill. Adm. Code 704.181(d)):

i. Any monitoring or other information which indicates any contaminant may cause an endangerment to underground sources of drinking water.

ii. Any noncompliance with a permit condition or malfunction of the injection system and/or monitoring Verification Well(s) which may cause fluid migration into or between underground sources of drinking water.

15. Transfer of Permit.

    a. Transfers. This permit is not transferable to any person except after notice to the Illinois EPA. The Illinois EPA may require modification of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the appropriate Act. (35 Ill. Adm. Code 702.152(c))

    b. Transfer by modification. A permit may be transferred by the Permittee to a new owner or operator only if the permit has been modified (under 702.183 through 185), reissued or a minor modification made (under Section 702.187(d)), to identify the new Permittee and incorporate such other requirements as may be necessary under the appropriate Act. The new owner or operator to whom the permit is transferred shall comply with all the terms and conditions specified in such permit. (35 Ill. Adm. Code 702.182(a))

    c. Automatic transfers. (35 I.A. C. 702.182) As an alternative to transfers under condition 15(b), a UIC permit for a well not injecting hazardous waste may be automatically transferred to a new permittee if:

        i. The current permittee notifies the Illinois EPA at least 30 days in advance of the proposed transfer date, described in 15(c)(ii) of this section;

        ii. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new permittees;

        iii. The notice demonstrates that the financial responsibility requirements of 35 Ill. Adm. Code 704.189 will be met by the new permittee and that the new permittee agrees to comply with all the terms and conditions specified in the permit to be transferred under automatic transfer conditions; and

        iv. The Illinois EPA does not notify the existing Permittee and the proposed new Permittee of its intent to modify the permit. A modification under this subparagraph may also be a minor modification under 35 Ill. Adm. Code 702.187. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in 15(c)(ii).

16. Financial Responsibility. (35 Ill. Adm. Code 704.189) The Permittee shall maintain financial responsibility and resources to close, plug, and abandon the underground injection well, Verification Well(s) and the Geophone Monitoring Well located at this facility in a manner prescribed by the Illinois EPA, and Condition H.23 of this permit.

a. The Permittee must show evidence of financial responsibility to the Illinois EPA by the submission of a surety bond, other adequate assurance such as financial statements, or other materials acceptable to the Illinois EPA.

b. The financial documents submitted must be revised and maintained as specified in 35 Ill. Adm. Code 704 and 40 CFR 144.

c. Construction and/or operation of the injection well or Verification Well(s) is prohibited unless the Permittee has adequate financial assurance as described in subpart (a) of this condition.

17. Cost Estimates for Plugging and Abandonment. (35 Ill. Adm. Code 704.212)

a. The Owner or Operator must prepare a written estimate, in current dollars, for the cost of implementing the plugging and abandonment plan as identified in Condition H.23. The cost estimate must equal the cost of plugging and abandonment at the point in the facility's operating life when the extent and manner of its operation would make plugging and abandonment the most expensive. The currently approved cost estimate for plugging and abandonment of the wells under this permit are:

- $359,000 Injection Well (2008 dollars);
- $83,000 Geophone Monitoring Well (2008 dollars)
- $318,000 Verification Well (2009 dollars per well)

b. The Permittee must adjust the cost estimate for inflation within 30 days after each anniversary of the date on which the first cost estimate was prepared. The adjustment must be made as specified in paragraphs (i) and (ii) of this condition, using an inflation factor derived from the annual Oil and Gas Field Equipment Cost Index. The inflation factor is the result of dividing the latest published annual Index by the Index for the previous years.

i. The first adjustment is made by multiplying the cost estimate by the inflation factor. The result is the adjusted cost estimate.

ii. Subsequent adjustments are made by multiplying the latest adjusted cost estimate by the latest inflation factor.

c. The Permittee must review the cost estimate whenever a change in the plan increases the cost of plugging and abandonment. The revised cost estimate must be adjusted for inflation as specified in paragraph (b) of this condition.

d. The Permittee must keep the following at the facility during the operating life of the facility:

i. the latest cost estimate prepared in accordance with paragraphs (a) and (c) of this condition and,

ii. the latest adjusted cost estimate prepared in accordance with paragraph (b) of this condition.

18. Insolvency of Financial Institution (35 Ill. Adm. Code 702.160)

a. A Permittee shall notify the Waste Reduction and Compliance Section, Division of Land Pollution Control, by certified mail of the commencement of a voluntary or involuntary proceeding under 11 U.S.C. (Bankruptcy), naming the owner or operator as debtor, within 10 business days after the commencement of the proceeding. A guarantor of a corporate guarantee as specified in 35 Ill. Adm. Code 704.219 must make such a notification if the guarantor is named as debtor, as required under the terms of guarantee in 35 Ill. Adm. Code 704.240.

b. A Permittee who fulfills the requirements of 35 Ill. Adm. Code 704.213 by obtaining a letter of credit, surety bond or insurance policy will be deemed to be without the required financial assurance in the event of bankruptcy insolvency or a suspension or revocation of the license or charter of the issuing institution. The owner or operator must establish other financial assurance within 60 days after such an event.

19. Revocation of Permits. (35 Ill. Adm. Code 702.186) The Illinois Pollution Control Board will revoke a permit during its term in accordance with Title VIII of the Illinois Environmental Protection Act or the Illinois EPA will deny permit renewal for the following causes:

a. The Permittee's violation of the Environmental Protection Act or regulations adopted thereunder;

b. Noncompliance by the Permittee with any condition of the permit;

c. The Permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the Permittee's misrepresentation of any relevant facts at any time; or

d. A determination the permitted activity endangers human health, or the environment and can only be regulated to acceptable levels by permit modification or revocation.

20. State Mining Board Permits. Issuance of this permit does not relieve the Permittee of the responsibility of complying with the provisions of Illinois State Mining Board Rules and Regulations and an Act in Relation to Oil, Gas, Coal, and Other Surface and Underground Resources. (Rule II, Illinois Department of Natural Resources, Office of Mines and Minerals, Division of Oil and Gas, Rules and Regulations)

21. False or Omitted Information.

    a. The Permittee shall not make any false statement, representation, or certification in any application, record, report, plan, or other document submitted to the Illinois EPA, the United States Environmental Protection Agency (USEPA), or required to be maintained under this permit.

    b. If, or when, the Permittee becomes aware of a failure to submit any relevant facts in a permit application or incorrect information was submitted in a permit application or in any report to the Illinois EPA, the Permittee shall promptly submit such facts or correct information to the Permit Section, Division of Land Pollution Control within ten (10) days. (35 Ill. Adm. Code 702.152(h))

22. Restriction on Unpermitted Waste. Only supercritical carbon dioxide generated by ADM's ethanol fermentation operation at this facility may be injected into the injection well CCS #1 under this permit. Other fluids may be injected into injection well CCS #1 for short periods for purposes of well testing, well stimulation or for the purposes of formation testing. The Permittee shall provide notice to the Illinois EPA of these tests in accordance with Condition H.26(e).

23. Plugging and Abandonment.

    a. The Permittee shall notify the Permit Section, Division of Land Pollution Control, 45 days prior to abandonment of the injection well, a Verification Well or the Geophone Monitoring Well. Plans for plugging and abandonment must be submitted 180 days prior to abandonment. (35 Ill. Adm. Code 704.181(e))

    b. The Permittee shall plug and abandon the injection well as provided in 35 Ill. Adm. Code 704.188 and 730.110 and in accordance with the schedule and provisions of the approved plugging and abandonment plans as modified by conditions of this permit. The approved plans consists of Section 10 – Form 4g, Plugging and Abandonment of the permit application Log # UIC-143; the Geophone Well Abandonment Plan as described in the permit modification application, Log # UIC143-M-1; and in Part 2, Verification Well Modifications Form 4g, Plugging and Abandonment of the permit modification application, Log # UIC143-M-2, identified in Attachment J. These plugging and abandonment plans are herein incorporated by reference. (35 Ill. Adm. Code 704.188).

c. The plugging and abandonment plan for the injection well shall be modified such that the well shall be cemented from total depth to the surface. The cement shall be staged in proper intervals using cement that is appropriate for plugging.

d. No later than 60 days after plugging and abandonment of the injection well, Geophone Monitoring Well or a Verification Well, the Permittee shall submit a plugging report to the Permit Section, Division of Land Pollution Control. The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of:

i. A statement that the well was plugged in accordance with the plan most recently submitted to the Illinois EPA; or

ii. A statement defining the actual plugging and explaining why the Illinois EPA should approve such deviation, if the actual plugging differed from the approved plan. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Illinois EPA to require the operator to replug the well; and

iii. Copy of well plugging affidavit submitted to the Illinois Department of Natural Resources, Office of Mines and Minerals, Division of Oil and Gas; and the Illinois Department of Public Health.

iv. If an approved plugging and abandonment plan requires a change, a revised plan shall be submitted to the Permit Section, Division of Land Pollution Control for approval. A revised plugging and abandonment plan for the injection well, if approved, will replace Attachment A and become a part of this permit as a modification. A revised plugging and abandonment plan for the Geophone Well or the Verification Well, if approved, will be added as an attachment to the permit or incorporated by reference and become a part of this permit as a modification.

24. Conversion of Wells (35 Ill. Adm. Code 704.181(e)) The Permittee shall notify the Permit Section, Division of Land Pollution Control, 45 days prior to conversion of any well. Plans for conversion must be submitted 180 days prior to actual conversion or abandonment. Injection into converted wells shall not be conducted until the Permittee receives written authorization for injection from the Illinois EPA.

25. Inactive Wells. (35 Ill. Adm. Code 704.188) After cessation of injection for two (2) years, the Permittee shall plug and abandon the well in accordance with Condition H.23 of this permit and 35 Ill. Adm. Code 730.110, unless the Permittee has:

a. Provided notice to the Permit Section, Division of Land Pollution Control; and

b. Described actions or procedures, which are deemed satisfactory by the Illinois EPA, to ensure the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells, including mechanical integrity testing, unless waived by the Illinois EPA in writing.

26. Duty to Establish and Maintain Mechanical Integrity of the Injection Well (35 Ill. Adm. Code 704.181(h) and 704.190)

a. The Permittee shall establish prior to commencing injection and thereafter mechanical integrity as defined in 35 Ill. Adm. Code 730.108.

b. A demonstration of mechanical integrity in accordance with Attachment A of this permit shall be conducted to ensure the well has integrity during the life of this permit. A descriptive report of all geophysical logs prepared by an independent log analyst, interpreting the results shall be submitted with log analyses to the Permit Section, Division of Land Pollution Control. This report shall be signed by the analyst and shall include his/her phone number.

The descriptive report should also discuss (1) changes in the structure of the well detected by the geophysical logging; (2) the location of defects; (3) any additional monitoring or corrective action that may be needed to assure the integrity of the well; and (4) an evaluation of the impact any defect may have on the integrity of the well and its ability to contain the injectate and protect USDWs over its operating life.

c. The Permittee shall demonstrate the absence of significant leaks in the casing, injection tubing, and packer by use of an annulus pressure test to be conducted annually. The annulus pressure test shall be conducted in accordance with Attachment A, USEPA Region V guidance Determination Of The Mechanical Integrity Of Injection Wells – Attachment 1 (Revised June 11, 1998), and the following conditions:

i. The annular space must be completely filled with annular fluid.

ii. A positive pressure differential between the pressure in the annular space and the injection tubing pressure of at least 100 psi shall be maintained throughout the entire annular space.

iii. Measurements of pressure should be taken at a minimum of every ten minutes.

iv. The well will be deemed to have failed the annulus pressure test if a pressure change of greater than 3% occurs over a one hour period.

d. The Permittee shall demonstrate the absence of significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore by use of a temperature survey and a time-lapse sigma log. These tests shall be run biannually (every 24 months) in accordance with the procedures outlined in Attachment A.

e. The Permittee will inform the Permit Section, Division of Land Pollution Control, of its intent to conduct pressure test(s), and temperature log(s), plus any additional mechanical tests, logs, or inspections, at least thirty (30) days prior to the demonstration of mechanical integrity. The notice must include the type of test to be conducted, any fluid that will be injected as part of the test, and a demonstration that the fluid will be compatible with the injection well material, formation and carbon dioxide that may come into contact with the testing fluid. If a demonstration of this compatibility has previously been submitted the Permittee may reference the previous submittal.

Should the Permittee not be able to provide the Agency with thirty (30) days advanced notice due to unexpected events, the Permittee shall provide notification within twenty-four (24) hours of the Permittee becoming aware of the need to conduct one or more of the test, logs or inspections identified above. This twenty-four (24) hour notification shall be provided via email and\or telephone to:

Champaign Field Operations Section
E-mail: Jeff.Turner@Illinois.gov
Phone Number: 217-278-5822

Division of Land Pollution Control Permit Section
E-mail: Kevin.Lesko@Illinois.gov
Phone Number: 217-524-3271

A written submission shall also be provided to the Permit Section, Division of Land Pollution Control, within 5 days. The written submission shall contain:

i. The nature of the work to be done;

ii. The reason that the work is required to be conducted without providing thirty (30) days notice; and

iii. A tentative schedule of work to be performed, including an estimate of when required testing may be performed.

f. A cement bond log must be run in the entire length of the long string casing whenever the injection tubing is removed from the well. If the injection tubing is removed more than once in a five year period, only one cement bond log shall be required.

g. An electromagnetic casing inspection log shall be run to determine the thickness, external condition, and internal condition of the long string casing for its entire length. This log shall be run when the tubing is removed from the well for the cement bond log. If the injection tubing is removed more than once in a five year period, only one electromagnetic log shall be required.

h. The Permittee shall cease injection if an apparent loss of mechanical integrity as defined by 35 Ill. Adm. Code 730.108, or Attachment A of this permit, becomes evident during operation or at the time of the mechanical integrity demonstration. Operation shall not be resumed until the Permittee has complied with the provisions of this permit, and applicable regulations, regarding mechanical integrity demonstration and testing.

i. All gauges used in mechanical integrity demonstrations or in daily operations (wellhead surface pressure PIT-009, annulus surface pressure PIT-014, injection fluid surface temperature TIT-009, injection fluid flowrate FIT-006 annular pressure -PIT-202, tubing pressure gauge - PIT-201 and Westbay QA zone monitoring – WBQ) shall be calibrated according to the procedures of the National Bureau of Standards, initially and at least annually thereafter. A copy of the calibration certificate shall be submitted to the Permit Section, Division of Land Pollution Control on January 15 of each year. In addition, recording devices are to be time synchronized at least quarterly.

j. In addition to the mechanical integrity demonstration required by this permit, the Illinois EPA has the authority to require the Permittee to conduct a demonstration of mechanical integrity of the well at any time well operations, or other information, leads the Illinois EPA to decide an additional mechanical integrity demonstration is necessary. The notice requiring the mechanical integrity demonstration shall be in writing and contain justification for requiring the additional testing.

27. Contingency Plan. The Permittee shall implement the contingency plan in accordance with the plans and methods described in the permit modification application, Log # UIC143-M-2, identified in Attachment J and as described in Attachment H of this permit.

28. 39i Certification. The Permittee shall submit a 39i certification and supporting documentation within 30 days of any of the following events:

    a. the owner or operator or officer of the owner, or operator, or any employee who has control over operating decisions regarding the facility has violated federal, State, or local laws, regulations, standards, or ordinances in the operation of waste management facilities or sites; or

    b. the owner or operator or officer of the owner, or operator, or any employee who has control over operating decisions regarding the facility has been convicted in this or another State of any crime which is a felony under the laws of this State, or conviction of a felony in a federal court; or

    c. the owner or operator or officer of the owner, or operator, or any employee who has control over operating decisions regarding the facility has committed an act of gross carelessness or incompetence in handling, storing, processing, transporting or disposing of waste.

    d. a new person is associated with the owner or operator who can sign the application or who has control over operating decisions regarding the facility, such as a cooperate officer or a delegated employee.

    The certification shall describe the violation(s), convictions, carelessness or incompetence as outlined in a, b, or c above and must include the date that a new person as described in d above began employment with the applicant.

    The 39i certification and supporting documentation shall be submitted to the address specified below:

    Illinois Environmental Protection Agency
    Bureau of Land #33
    39(i) Certification
    1021 North Grand Avenue East
    Post Office Box 19276
    Springfield, Illinois 62794-9276

29. Future Regulations. On December 10, 2010 US EPA issued final rules under the Safe Drinking Water Act (SDWA) for underground injection of carbon dioxide for the purpose of geologic sequestration. Pursuant to the requirements of 40 Code of Federal Regulation § 146.81(c) the Permittee must apply to the USEPA for a Class VI permit by December 10, 2011.

30. Future changes to the permit will be processed in accordance with 35 Ill. Adm. Code 704 Subpart H. When required by 35 Ill. Adm. Code 704 Subpart H, the Agency will

prepare a draft permit, public notice its availability for public review and accept comments in accordance with the requirements of 35 Ill. Adm. Code 705.

31. ADM has submitted an application dated July 2011, entitled "Underground Injection Control Permit Application IL- ICCS Project," to the USEPA. This is an application for the construction of an additional carbon sequestration well identified as CCS#2. It appears that this well will be located approximately 3,500 ft. from injection well CCS #1, and within the Area of Review established for CCS#1. Section 5 ("Area of Review") of the application includes the results of a simulation of the operation of both CCS#1 and CCS#2 wells and confirms that the simultaneous operation of the wells will impact the other within the shared injection zone.

    Should operation of CCS#2 be approved by the USEPA, ADM must modify Illinois EPA permit application to address the interaction that would result from the operation of the second well. Pursuant to 35 Ill. Adm. Code 704.191; 704.193; 730.106; and 730.107 operation of CCS#1 under the permit being issued herein may be prohibited if injection well CCS#2 begins operation under a USEPA permit, until such time that the Illinois EPA approves a permit modification to address the impact that the additional well CCS#2 would have on injection well CCS#1.

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I. GROUNDWATER MONITORING

1. SUMMARY

ADM will install groundwater monitoring wells that will constitute the groundwater monitoring program associated with the injection well process for the UIC for the duration of the Permit.

2. DEFINITIONS

a. "Lowermost USDW" refers to the definition of such as found in 35 Ill. Adm. Code 702.110.

b. "Ft-bgs" refers to the number of feet below the ground surface.

c. "Ft-MSL" refers to the number of feet below the ground surface referenced to Mean Sea Level.

d. "Detected" shall mean a concentration equal to or above the PQL for the applicable analytical methods specified in the approved Sampling and Analysis Plan, which are incorporated by reference in Condition I.8 of the Permit.

e. "Progressive Increase" shall mean an increase in concentration of a constituent in successive sampling events.

f. 'Stick-up" refers to the height of the reference survey detection. This point is determined within $\pm$ 0.01 foot in relation to Mean Sea Level, which in turn is established by reference to an established National Geodetic Vertical Datum.

3. IMPLEMENTATION

a. The Permittee shall implement the groundwater monitoring program established herein, upon the effective date of the Permit.

b. The Permittee shall carry out the groundwater monitoring program specified in this Permit on the groundwater present in the lowermost USDW above the injection zone.

4. WELL LOCATIONS AND CONSTRUCTION

a. The Permittee shall install and maintain the groundwater monitoring wells identified in the table below to allow for the collection of groundwater samples and elevations from the groundwater monitoring wells completed in the lowermost USDW. The locations are identified in Figure 4 of Appendix H of the approved Permit Application.

IEPA Well No.	ADM Well No.	Well Depth (Ft-bgs)	Well Depth Elevation (Ft-MSL)	Well Screen Interval (Ft-MSL)
G101	G101	141.6	531.59	532.09-542.09
G102	G102	142.5	530.93	531.43-541.43
G103	G103	141.6	531.18	531.68-541.68
G104	G104	139.6	542.32	542.82-552.82

b. The Permittee shall construct the groundwater monitoring wells in such a manner as to prevent the movement of fluids into or between underground sources of drinking water. The casing and cementing used in the construction of the wells shall be designed for the life expectancy of the wells.

c. Construction of any new monitoring well/piezometer for inclusion in the permitted groundwater monitoring system must be at a minimum in accordance with the diagram contained in Attachment F to this Permit unless otherwise approved in writing by the Illinois EPA. Any new monitoring well/piezometer must be continuously sampled and logged on Illinois EPA boring logs. An Illinois EPA approved monitoring well diagram, boring logs, and monitoring well completion reports are included as Attachment F to this permit and can be found at http://www.epa.state.il.us/land/regulatory-programs/permits-and-management/forms/index.html#groundwater-permits.

d. The Permittee shall notify the Illinois EPA within thirty (30) days in writing if any of the groundwater monitoring wells identified in Condition I.4(a) above becomes damaged or the structural integrity has been compromised. A schedule for the replacement of the subject well shall accompany this notification. The well shall not be plugged until the new well is on-line and monitoring data has been obtained and verified, unless the well is extremely damaged and would create a potential route for groundwater contamination. Upon replacing the subject well, the Permittee shall provide written documentation to the Illinois EPA regarding the well installation procedures and construction.

e. Should any well become consistently dry or unserviceable; a replacement well shall be provided within ten (10) feet of the existing well. This well shall monitor the same zone as the existing well and be constructed in accordance with the current Illinois

EPA groundwater monitoring well construction standards at the time that the well is replaced. A replacement well which is more than ten (10) feet from the existing well or does not monitor the same geologic zone must be approved by the Illinois EPA and designated as a new well.

f. The Permittee shall submit boring logs, construction diagrams and data sheets from installation and development of a new or replacement well to the Illinois EPA at the address below with thirty (30) days of the date that installation of the well is completed. In addition, the Permittee shall submit certification that plugging and abandonment of a well was carried out in accordance with the approved procedures to the Illinois EPA at the address below within thirty (30) days of the date that the well is plugged and abandoned. All information should be submitted to the appropriate State Agencies.

Illinois Environmental Protection Agency
Bureau of Land - #33
Permit Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

g. All wells/piezometers shall be equipped with protective caps and locks. Monitoring wells or piezometers located in high traffic areas must protected with bumper guards.

h. All groundwater monitoring wells and piezometers not utilized in the groundwater monitoring system, but retained by the facility, must be constructed and maintained in accordance with 77 Ill. Adm. Code 920 regulations.

5. MONITORING PARAMETERS

a The Permittee shall determine groundwater quality at groundwater monitoring wells identified in Condition I.4(a) quarterly for the duration of the Permit. Samples collected during the quarterly events of each year shall be analyzed for the parameters below.

Field Parameters	Storet Number	Reporting Units
pH	00400	
Specific Conductance	00094	micromos/cm
Temperature of Water Sample	00011	°F
Dissolved Oxygen	00300	mg/L
Depth to Water (below land surface)	72019	Feet
Depth to Water (below measuring point)	72109	Feet

Elevation of Groundwater Surface	71993	Ft MSL
Elevation of Bottom of Well*	72020	Ft MSL
Elevation of Measuring Point (Top of Casing)**	72110	Ft MSL

* Shall be determined during the second sampling event each year.
** Shall be surveyed once every two (2) years or whenever the elevation changes as required by Condition I.7(b).

Indicator Parameters	Storet Number	Reporting Units
Alkalinity	00410	mg/L
Bromide	71870	mg/L
Calcium	00916	mg/L
Chloride	00940	mg/L
Sodium	00929	mg/L
Total CO_2	00405	mg/L

6. MONITORING PROGRAM

a. The Permittee shall determine groundwater quality at each monitoring well identified in Condition I.4(a) quarterly for the duration of the Permit. The Permittee shall express the groundwater quality at each monitoring well in a form necessary for the determination of statistically significant changes.

b. The geologic media to be monitored must be the same formation and hydraulically connected to that formation which is determined to be the lowermost USDW beneath the facility.

c. Groundwater quality in geologic units identified as the lowermost USDW must meet 35 Ill. Adm. Code 620.410 Groundwater Quality Standards unless greater background values are determined to be appropriate.

d. The Permittee shall establish background values in accordance with the procedures specified in Appendix H of the approved Permit Application.

e. The Permittee shall determine the groundwater flow rate and direction in the lowermost USDW quarterly and report to the Illinois EPA at least annually from monitoring wells identified in Condition I.4(a).

f. The Permittee shall evaluate the results of the analysis required by Condition I.6(a) above and identify:

   i. The concentration of any constituent detected which was not detected in the previous sampling event.

   ii. The concentration of any constituent detected which exhibits a progressive increase over four (4) consecutive sampling events.

g. The Permittee shall determine whether there is a statistically significant increase, (or decrease in the case of pH) over the background values established for each parameter identified in Condition I.5(a) each time groundwater quality is determined. In determining whether significant changes have occurred the Permittee shall evaluate the date in accordance with the procedures specified in Appendix H of the approved Permit Application.

7. GROUNDWATER ELEVATION

a. The Permittee shall determine the groundwater surface elevation referenced to mean sea level (MSL) at each groundwater monitoring well each time groundwater is sampled in accordance with Condition I.10(c).

b. The Permittee shall determine the surveyed elevation of "stick-up" referenced to MSL when the well is installed (with as-built diagrams) and every two (2) years, or at the request of the Illinois EPA, or whenever the elevation changes in accordance with Condition I.10(d).

c. Elevation, as referenced to MSL, of the bottom of each monitoring well is to be reported at least annually. The mandatory measurement shall be taken during the second quarterly sampling event each year.

8. SAMPLING AND ANALYTICAL PROCEDURES

The Permitee shall use the techniques and procedures described in Appendix H of the approved Permit Application when obtaining and analyzing samples for the groundwater monitoring wells identified in Condition I.4(a) above.

a. Samples shall be collected by the techniques described in Appendix H of the approved Permit Application.

b. Samples shall be preserved, shipped and handled in accordance with the procedures specified in Appendix H of the approved Permit Application.

c. Samples shall be analyzed in accordance with the methods in which the PQLs are less than or equal to the applicable 35 Ill. Adm. Code 620.410 Groundwater Quality Standard.

d. Samples shall be tracked and controlled using the chain-of-custody procedures specified in Appendix H of the approved Permit Application.

9. STATISTICAL PROCEDURES

When evaluating the monitoring results in accordance with Condition I.6(a) above, the Permittee shall use the procedures specified in Appendix H of the approved Permit Application.

10. REPORTING AND RECORDKEEPING

a. The Permittee shall enter all monitoring, testing, and analytical data obtained in accordance with Condition I.5, I.6, I.7, I.8 and I.9 in the operating record.

b. Samples collected to meet the requirements of the groundwater monitoring program described in Conditions I.5 and I.6, I.7, and I.9 shall be collected and reported, as identified in the table below. The results of analysis conducted on the groundwater quality samples shall be submitted in accordance with this schedule to the address listed in Condition I.4(f) above. All additional information required by the groundwater monitoring program (as specified in Conditions I.5, I.6, I.7, and I.9) shall also be submitted to the Illinois EPA at the address listed in Condition I.4(e) in accordance with this schedule.

Samples to be Collected During The Months of	Results Submitted to the Illinois EPA by the Following
January - February	April 15
April – May	July 15
July – August	October 15
October – November	January 15

c. Groundwater surface elevation measured pursuant to Condition I.7(a) shall be collected quarterly and submitted to the Illinois EPA as identified in the table above.

d. The Permittee shall report the surveyed elevation, as required by Condition I.7(b) of the top of the well casing ("stick-up"), referenced to MSL in accordance with the following schedule:

i. For wells identified in Condition I.4(a) every two (2) years (during the second quarterly sampling event), or at the request of the Illinois EPA or whenever the elevation changes.

ii. For any new wells, at the time of installation and reported in the as-built diagrams. Subsequent measurements shall be made every two (2) years or whenever the elevation changes.

e. The Permittee shall report the elevation of the bottom of each monitoring well identified in Condition I.4(a) referenced to MSL, annually.

f. The Permittee shall submit a completed "RCRA Facility Groundwater, Leachate and Gas Reporting Form" (LPC) as a cover sheet for any notices or reports required by the facility's Permit for identification purposes. Only one copy of the LPC 592 must accompany your submittal. However, the Permittee must submit one (1) original and (excluding the groundwater monitoring results submitted in electronic format) a minimum of two (2) copies of each notice or report you submit to the Illinois EPA. The form is not to be used for permit modification requests.

g. Information required by Conditions I.10(b), I.10(c), I.10(d) and I.10(e) must be submitted in an electronic format. The information is to be submitted, as fixed-width text files formatted as found in Attachment G, in accordance with the schedule found in Condition I.10(b) above. Additional guidance regarding the submittal of the information in an electronic format can be found at www.epa.state.il.us/land/regulatory-programs/permits-and-management/index.html

h. The Permittee shall report all information to the Illinois EPA in a form which can be easily reviewed. All submittals contain tables of data drawings and text (as necessary) to accurately describe the information contained in the submittal.

i. In the event that the Permittee confirms that there has been a statistically significant change in groundwater quality the Permittee may demonstrate that a source other than the injection process caused the impact on groundwater or that the source resulted from an error in sampling, analysis, or evaluation. To make this demonstration the Permittee shall:

i. Notify the Illinois EPA in writing within seven (7) days of the confirmation of the impact on groundwater quality that they intend to make this demonstration;

ii. Submit a report to the Illinois EPA, for review and approval, within ninety (90) days which demonstrates that a source other than the injection process caused the impact on groundwater or that the source resulted from an error in sampling, analysis, or evaluation.

j. In the event that the Permittee confirms that there has been an impact on groundwater quality as a result of the injection process into the injection zone, the Permittee shall:

i. Notify the Illinois EPA in writing within seven (7) days of the confirmation of the impact on groundwater quality, identifying each well and parameter;

ii. Discontinue the injection process;

iii. Submit an assessment monitoring plan within thirty (30) days of the confirmation of the impact on groundwater quality. The assessment monitoring program shall include appropriate methods to determine the source of the contamination, characterize the nature and extent of the groundwater contamination, potential threat to human health and the environment, and an assessment of potential migration;

iv. Submit an assessment report, based on and including the data and information generated from the completion of Condition I.10(j)(iii) to the Illinois EPA within ninety (90) days of the approval of the assessment monitoring plan.

v. Propose a corrective action plan if assessment monitoring indicates that the injection process has impacted groundwater. The corrective action plan shall be submitted within thirty (30) days of approval of the assessment report required by Condition I.10(j)iv and include appropriate response action to address any impact of the lowermost USDW. The plan shall be implemented within thirty (30) days of Illinois EPA approval.

11. REQUEST FOR PERMIT MODIFICATION

If the Permittee determines that the groundwater monitoring program no longer satisfies the requirements of 35 Ill. Adm. Code 702, 704 and 730 (e.g. impact to groundwater), the Permittee must submit an application for a permit modification. The permit modification must be submitted to the Illinois EPA within ninety (90) days describing any appropriate changes to the program which will satisfy the regulations.

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ATTACHMENT A

PROCEDURES USED FOR MECHANICAL INTEGRITY

PROCEDURES USED FOR MECHANICAL INTEGRITY

I. ANNULUS PRESSURE TEST

A. Initial Tests

To be completed during the installation of the well per standard and best completion practices.

1. Move in and rig up workover rig
2. Nipple up BOP (blow out preventer)
3. Pick up packer, tubing and subsurface monitor equipment
4. As each joint or section of joints is run into the hole, test below rotary with hydrotesters to at least 50% of burst.
5. Put packer on depth and set
6. Close pipe rams and/or hydril
7. Test packer on the casing-tubing annulus side for one hour at 1000 psi or greater
8. Bleed off pressure, release pipe rams and/or hydril
9. Hang off tubing, nipple up injection tree and test tree to at greater than or equal to the maximum expected injection pressure for one hour
10. Any significant pressure drop will be investigated to verify that mechanical integrity is intact and corrected as necessary. Pressure test will be rerun following investigation / remediation to confirm integrity.
11. Rig down, move off workover rig

The data obtained, including recorded charts from the tests, shall be submitted as required by the permit.

B. Subsequent Tests

To be completed following a period of carbon dioxide injection.

1. Stop injection and allow well to stabilize
2. Confirm connectivity to and functionality of permanent gauges or install pressure gauge on annulus
3. Rig up pump, pressurize annulus to 1000 psi
4. Observe pressure change over a 1 hour period
5. Any significant pressure drop will be investigated to verify that mechanical integrity is intact and corrected as necessary. Pressure test will be rerun following investigation / remediation to confirm integrity.
6. Plot the gathered data and determine volume of fluid loss if any.

The data obtained, including recorded charts from the tests, shall be submitted as required by the permit.

C. Continual Monitoring

During the injection timeframe of the project, the long string casing-tubing annulus pressure shall be monitored and recorded real time. Pressure in the long string casing-tubing annulus is anticipated to be from 400 to 500 psi. Any significant change of casing-tubing annulus pressure that can be related to mechanical integrity issues will be investigated as a possible leak in one of four areas:

- Casing - from the surface to the packer
- Tubing string - from the surface to the packer
- Packer seal
- Injection wellhead assembly

II. TIME-LAPSE SIGMA LOGGING AND TEMPERATURE SURVEYS

A. Initial Survey - Time Lapse Sigma Logs

To be completed before carbon dioxide injection with the tubing and annular fluid level at least to the Maquoketa Shale or higher (the Maquoketa Shale is located 2611 to 2817 feet below ground surface),

1. Move in and rig up electric logging unit with pressure control
2. Run base RST Sigma Log from total depth through at least the Maquoketa Shale
3. Rig down the logging equipment
4. Process and archive data as baseline

B. Subsequent Surveys - Time Lapse Sigma Logs

To be completed following a period of carbon dioxide injection, with the well in a static condition and fluid level within the tubing string to the Maquoketa Shale or higher

1. Move in and rig up electric logging unit with lubricator
2. Run RST Sigma Log from total depth through at least the Maquoketa Shale
3. Rig down the logging equipment
4. Process the data and compare to baseline log noting any changes in Sigma that can be attributed to carbon dioxide

C. Post Injection Temperature Surveys

Well should be in a state of injection for at least 6 hours prior to commencing operations in order to cool injection zones.

1. Move in and rig up an electrical logging unit with lubricator

2. Run a temperature survey from the Base of the Maquoketa Shale to the deepest point reachable in the Mt. Simon while injecting at a rate that allows for safe operations. Should operation constraints or safety concerns not allow for a logging pass while injecting; an acceptable, alternate plan is to stop injecting immediately prior to the first logging pass.
3. Stop injection, pull tool back to shallow depth, wait 1 hour.
4. Run a temperature survey over the same interval as step 2.
5. Pull tool back to shallow depth, wait 2 hours
6. Run a temperature survey over the same interval as step 2.
7. Pull tool back to shallow depth, wait 2 hours
8. Run a temperature survey over the same interval as step 2
9. Evaluate data to determine if additional passes are needed.
10. Rig down the logging equipment
11. Overlay data and interpret which zones are open to injection.
12. The data obtained shall be submitted as required by the permit.

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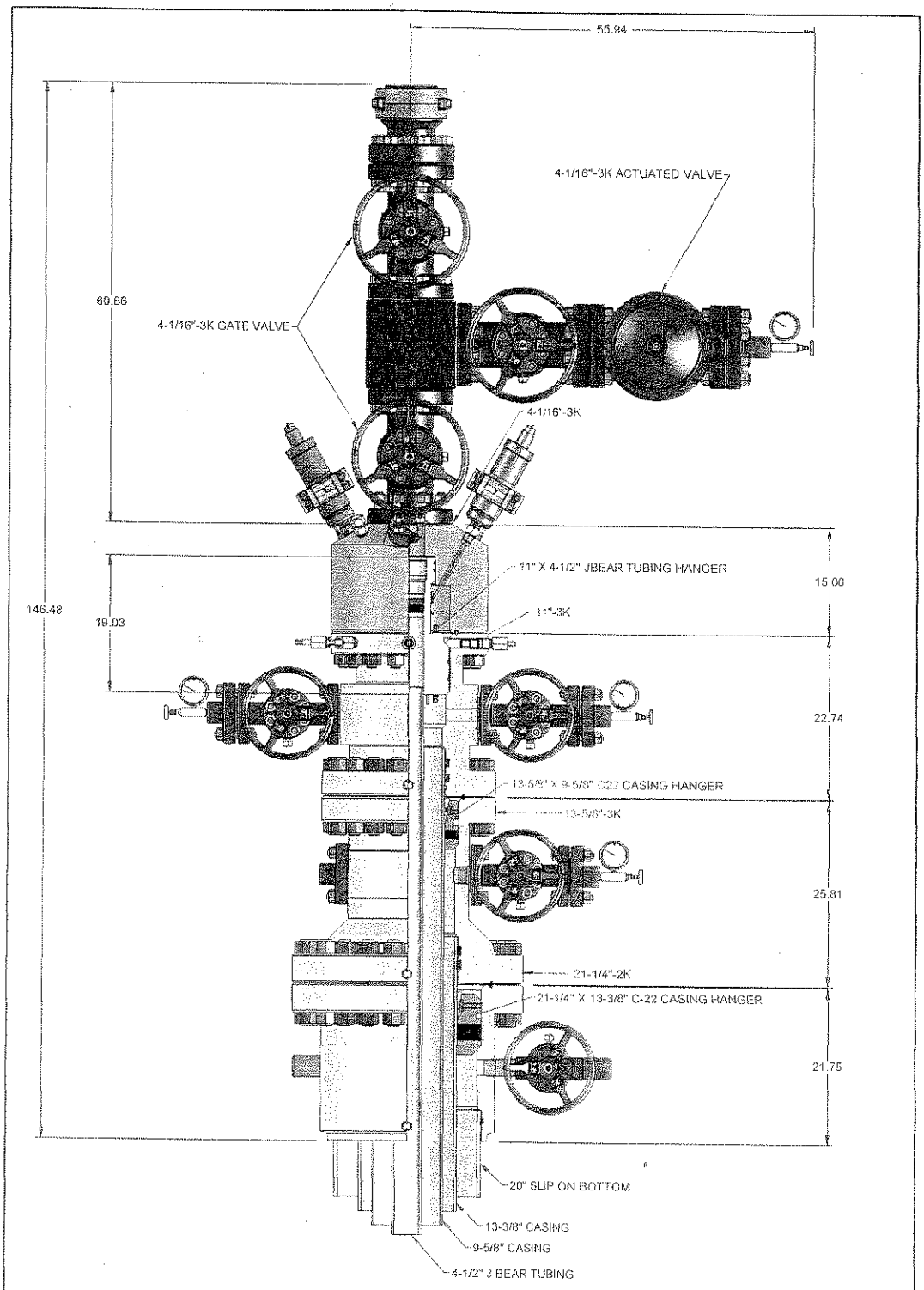
ATTACHMENT B

WELL DIAGRAMS

Injection Wellhead Assembly



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Injection Well Schematic

Surface Casing
Top Depth: 0 ft.
Bottom Depth: 355 ft.
O.D.: 20 in.
I.D.: 19.124 in.
Weight: 94 lbs/ft.
Grade: H-40

Intermediate Casings

Top Section
Top Depth: 0 ft.
Bottom Depth: 3630 ft.
O.D.: 13.375 in.
I.D.: 12.515 in.
Weight: 59.5 lbs/ft.
Grade: J-55

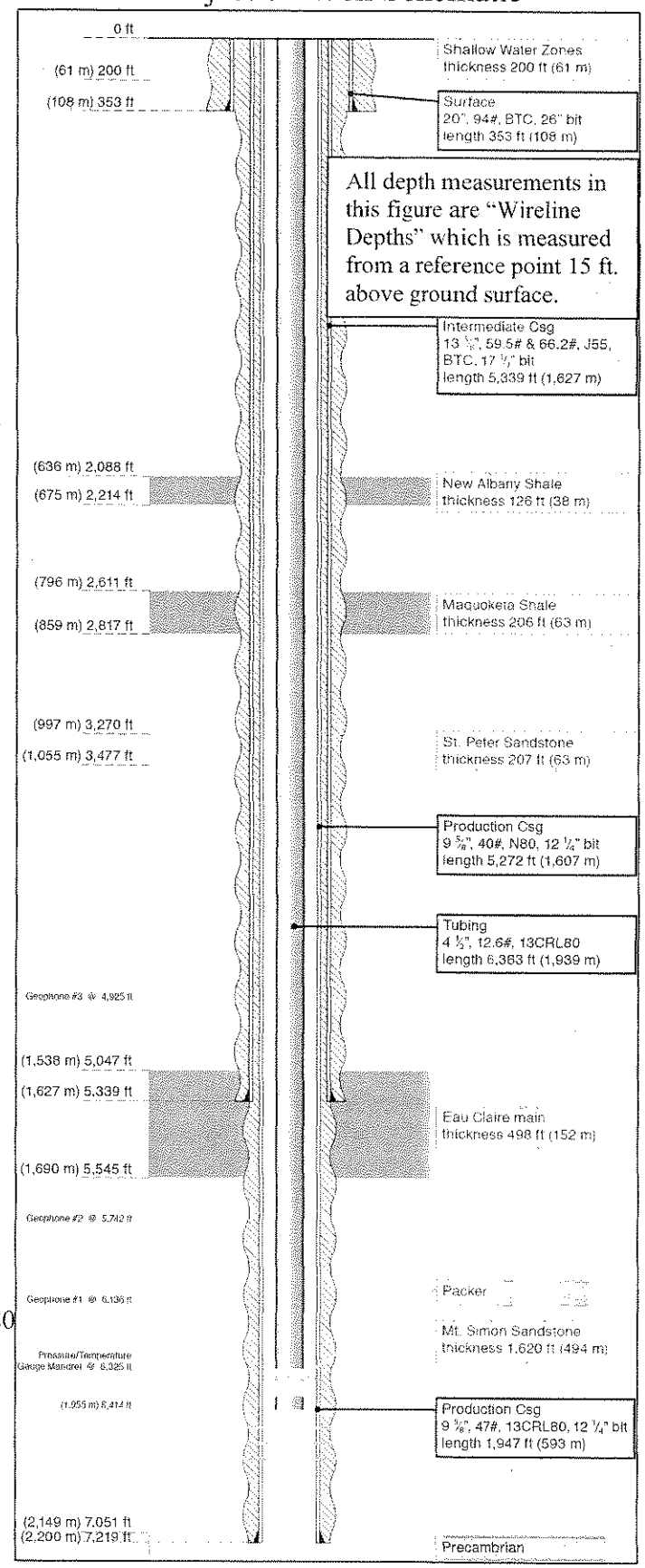
Bottom Section
Top Depth: 3630 ft.
Bottom Depth: 5339 ft.
O.D.: 13.375 in.
I.D.: 12.415 in.
Weight: 66.17 lbs/ft.
Grade: J-55

Long String Casings

Top Section
Top Depth: 0 ft.
Bottom Depth: 5272 ft.
O.D.: 9.625 in.
I.D.: 8.385 in.
Weight: 38.97 lbs/ft.
Grade: N-80

Bottom Section
Top Depth: 5272 ft.
Bottom Depth: 7219 ft.
O.D.: 9.625 in.
I.D.: 8.681 in.
Weight: 47 lbs/ft.
Grade: L-80, 13Cr80

Perforations
6962 – 6963 ft.
6967 – 6997 ft.
7010.5 – 7035.5 ft.



Ground Surface 674 ft. MSL

Injection Tubing
Top Depth: 0 ft.
Bottom Depth: 6348 ft.
O.D.: 4.5 in.
I.D.: 3.958 in.
Weight: 12.6 lbs/ft.
Grade: JFE-13Cr85

Packer
Schlumberger Quantum Max Type III
Q-Max 13-Chrome
Top of packer: 6348.7 ft.
Center of Sealing elements: 6350 ft.

Production String Assembly

Schlumberger

Illinois Basin - Decatur Project

Prepared for :	Date :	Casing :	Completion Type :	Pressure/Temp.	
Paul Huges	Nov-24-2009	9 5/8" 40&47# N-80& CR13	Upper Compleation		
Field Name :	Well Name :	Casing Drift	Rig:		
Illinois Basin	ADM CCS #1	ID 8.681/Drift 8.525	Wilson 28		
Prepared by :	District/Phone # :			3245psi BHP	
Roberto Schuldes	Houma, LA / (985) 851-1074			135 Degree F	
Production Tubing :					
4 1/2" 12.6# CR13 JFE Bear					

String Weight Include Block -		Rig: Ideco H-35/Pioner Rig 15	
Block Weight -		Item's Actual Pipe Measured Length -	6335.32
Weight On Locator -		Packer Fluid Type and Weight -	9.4 ppg NaCl
Original RKB -		Completion Fluid Type and Weight -	9.4 ppg NaCl

All Depths Are Wireline Depths

				Production String Assembly
0.00	0.55	11.000	3.958	**Hanger PN: HTG6561, Top Thread: 4-1/2 EUE 8rd**
0.55	30.75	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joints (5.52+10.34+8.34+6.55)
31.30	4883.83	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear tubing (Adjusted by 49.07)
4915.13	10.34	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
4925.47	9.97	8.350	3.958	**Geophone #3**
4935.44	10.34	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
4945.78	786.51	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear tubing
5732.29	10.36	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
5742.65	9.97	8.350	3.958	**Geophone #2**
5752.62	10.38	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
5763.00	236.64	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear tubing
5999.64	8.34	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
6007.98	118.40	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear tubing
6126.38	10.34	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
6136.72	9.97	8.350	3.958	**Geophone #1**
6146.69	10.34	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
6157.03	157.96	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear tubing
6314.99	10.36	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
6325.35	6.01	5.712	3.879	**4 1/2, 12.60, SGM-FS, NDPG/NLOG, SINGLE, TUBING**
6331.36	10.33	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
6341.69	10.33	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
6352.02	1.36	4.500	3.813	**4 1/2" x 3.813 X-nipple JFE Bear**
6353.38	10.33	4.500	3.958	4 1/2 12.6# 13Cr JFE Bear pup joint
6363.71	2.08	7.000	3.500	**4.75" Snap latch 13Cr (4 1/2 12.6# JFE Bear)**
6365.79	9.00	4.690	3.500	4.75" Seal Unit 4.124" 13Cr SLHT pin x box ID:127088 PN:4
6374.79	0.81	4.690	3.500	X-O, 4.063-8 SA Pin x 4.124" 13Cr SLHT Box PN: 100714412
6375.60	2.51	4.724	3.750	SAGS w/ inner sleeve 13chr 4.063 8SA Box ID: 164949-01, PN:100602582/AA
6378.11				End of Assembly

Depth	Length	ID	OD	Quantum Max Packer Assembly:
6363.71	6.47	4.750	8.341	9 5/8" x 4.75" (47-53.5#) Q-Max 13Cr w/HNBR ID# 259148-03
6370.18	0.83	5.443	7.013	X-O, 6.375" 6-SA Box x 6.25" 8-SA Box HOS-252940
6371.01	19.06	4.750	6.974	9 5/8" x 4.75" x 20' PBR PO# 101046
6390.07	1.14	3.431	6.950	X-O, 4" 11.6# NU 8rd Pin x 6.375" 6-SA Box HOS-252941
6391.21	10.33	3.442	4.752	4" NU 8rd 11.6# 13Cr85 Pup Joint w/ Collar
6401.54	1.54	3.313	4.744	4" x 3.313" X-Nipple C-36025-01
6403.08	10.31	3.442	4.745	4" NU 8rd 11.6# 13Cr85 Pup Joint w/ Collar
6413.39	0.71	3.672	4.780	4" NU 8rd 11.6# 13Cr85 Wireline Re-Entry Guide w/ mule shoe SO# 729775
6414.10				EOA

* All depth measurements in this table are "Wireline Depths" which is measured from a reference point 15 ft. above ground surface.

Verification Well #1 Schematic

Surface Casing

Top Depth:	0 ft.
Bottom Depth:	365 ft.
O.D.:	13.375 in.
I.D.:	12.615 in.
Weight:	54.5 lbs/ft.
Grade:	J-55

Intermediate Casing

Top Depth:	0 ft.
Bottom Depth:	5305 ft.
O.D.:	9.625 in.
I.D.:	8.835 in.
Weight:	40 lbs/ft.
Grade:	N-80

Long String Casings

Top Section

Top Depth:	0 ft.
Bottom Depth:	5041 ft.
O.D.:	5.5 in.
I.D.:	4.982 in.
Weight:	17 lbs/ft.
Grade:	J-55

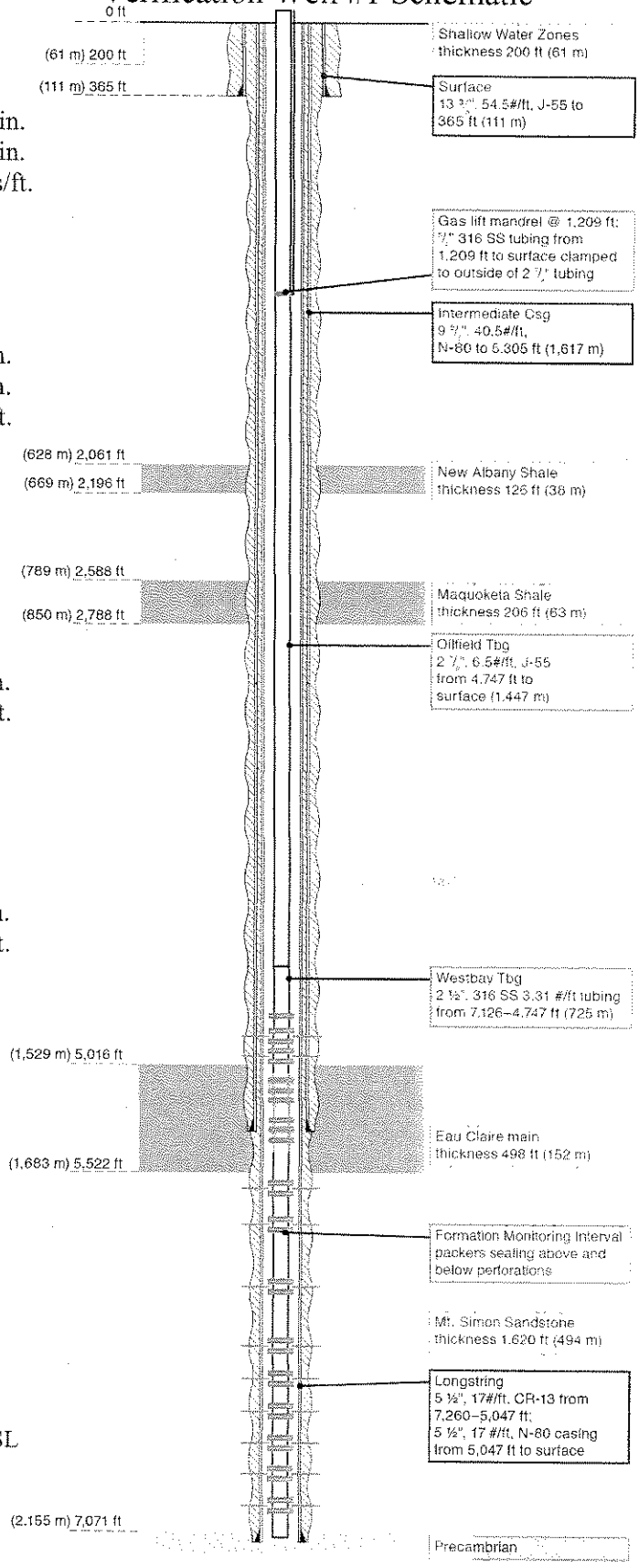
Bottom Section

Top Depth:	5041 ft.
Bottom Depth:	7260 ft.
O.D.:	5.5 in.
I.D.:	4.892 in.
Weight:	17 lbs/ft.
Grade:	13Cr85

Perforations

4902.5 - 4905.5 ft.
4985.7 - 4988.7 ft.
5638.8 - 5642.3 ft.
5825.4 - 5828.9 ft.
6401.2 - 6404.7 ft.
6617.3 - 6620.8 ft.
6705.3 - 6708.8 ft.
6822.1 - 6825.6 ft.
6930.6 - 6934.1 ft.
6968 - 6971.5 ft.
7046.2 - 7049.2 ft.

Ground Surface 669 ft. MSL



Production Tubing

Top Depth:	0 ft.
Bottom Depth:	4747 ft.
O.D.:	2.875 in.
I.D.:	2.44 in.
Weight:	6.5 lbs/ft.
Grade:	J-55

Westbay Tubing

Top Depth:	4747 ft.
Bottom Depth:	7126 ft.
O.D.:	2.5 in.
I.D.:	2.26 in.
Weight:	3.12 lbs/ft.
Grade:	316L SS

Westbay Packers

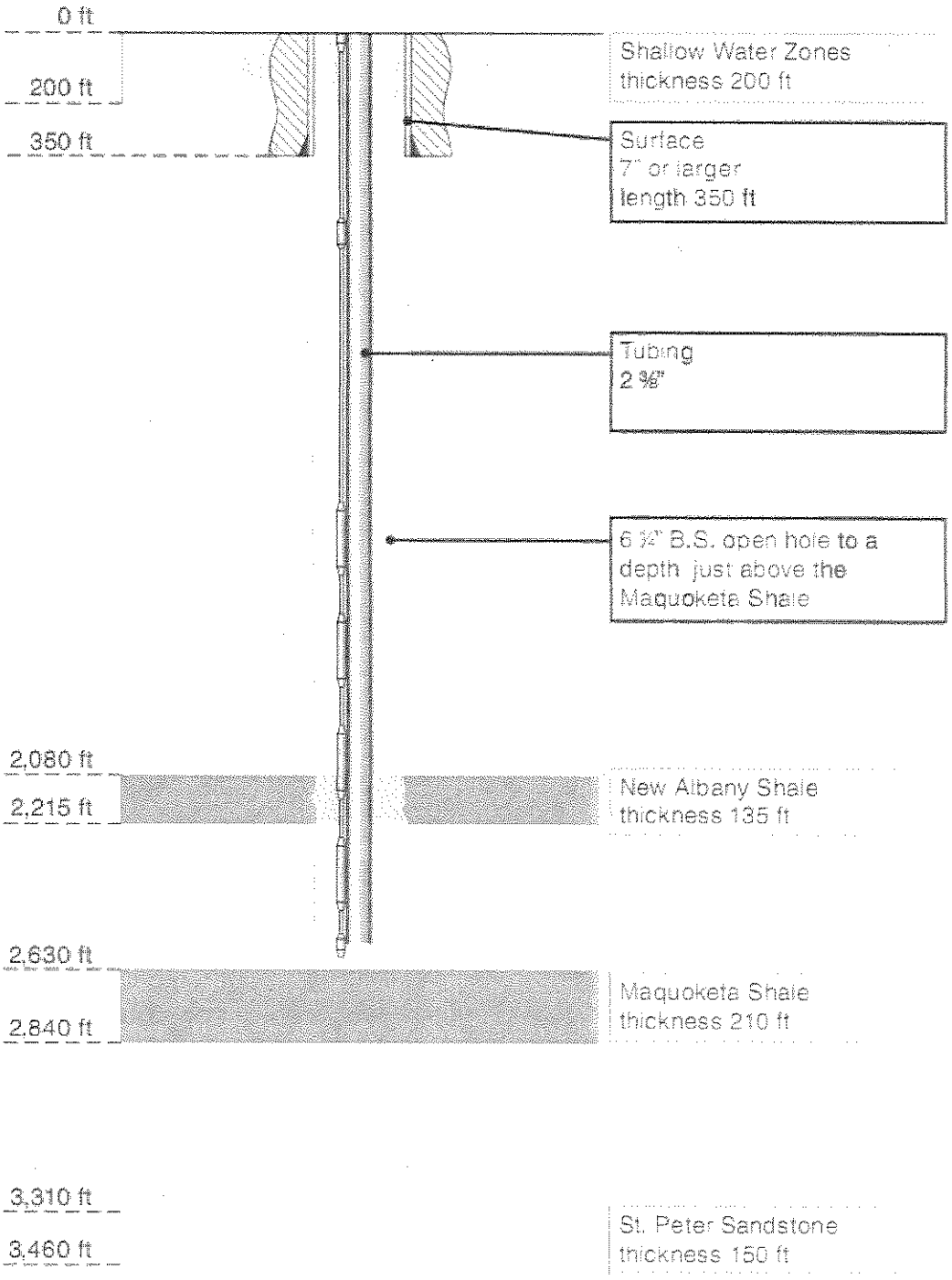
Westbay MP55
(Part #: 0414100C4)
316/316L Stainless Steel
Hydrogenated Nitrile Butadiene Rubber

Westbay Packers Depths (top of packer)

P 28 - 4823.8 ft.
P 27 - 4890.7 ft.
P 26 - 4937.9 ft.
P 25 - 4973.8 ft.
P 24 - 5021.0 ft.
P 23 - 5283.5 ft.*
P 22 - 5329.3 ft.*
P 21 - 5365.2 ft.*
P 20 - 5410.9 ft.*
P 19 - 5456.6 ft.*
P 18 - 5502.4 ft.*
P 17 - 5627.0 ft.*
P 16 - 5674.2 ft.
P 15 - 5813.5 ft.
P 14 - 5860.7 ft.
P 13 - 6389.3 ft.
P 12 - 6436.5 ft.
P 10 - 6605.4 ft.
P 9 - 6652.6 ft.
P 8 - 6693.4 ft.
P 7 - 6740.6 ft.
P 6 - 6811.0 ft.
P 5 - 6858.2 ft.
P 4 - 6918.7 ft.
P 3 - 6956.1 ft.
P 2 - 7003.3 ft.
P 1 - 7081.4 ft.

* QA Zones located between noted packers.
QA Zone between P18 & P19 continuously monitored.

Geophone Monitoring Well



ATTACHMENT C

PROCEDURE FOR CALCULATING AVERAGE VALUES

PROCEDURE FOR CALCULATING AVERAGE VALUES

Electronic Data Collection and Storage

The following procedures apply where data is collected and stored electronically:

1. Flow rate (mass/time) will be monitored continuously and clock hour averages will be generated as the default stored value.

2. Flow rate averages will be generated on a weekly basis (hourly averages from Monday 6:00 am to Sunday 5:59 am) by summing the hourly averages during injection and dividing by the number of injection hours.

3. Flow rate averages will be generated on a monthly basis (hourly averages from 6:00am to 5:59am) by summing the hourly averages during injection and dividing by the number of injection hours. Weeks will be designated as Calender Days 1-7, Days 8-14, Days 15-21, Days 22-28, and Days 29-31 (where applicable) of each calendar month.

4. Annulus and Injection Pressure averages will be handled in the same manner (i.e., continuous monitoring with hourly averages generated), but averages will not discount non-injection periods, i.e., reported weekly and monthly average values will include all hourly averages collected.

Mechanical Data Collection and Storage

The following procedures apply where data is collected and stored using paper strip charts and/or pencils for recording a graph, i.e., mechanical data collection devices:

$$\text{Weekly Average Flow Rate} = \frac{\text{Total volume injected (gal/week)}}{\text{(total hrs. of injection/week) (60 min./hr)}}$$

$$\text{Monthly Average Flow Rate} = \frac{\text{Total volume injected (gal/month)}}{\text{(total hrs. of injection/month) (60 min./hr)}}$$

The annulus pressure and injection pressure averages are to be calculated by an integration of the curve. The values for the annulus pressure average are the values at the beginning of each week, including all values during the week, and ending with the value at the end of each week. The monthly annulus pressure average is calculated with all values from the beginning of each month, to the end of the month.

When a month begins or ends in the middle of a week, the weekly charts shall be submitted with the monthly report which coincides with the initial date of each weekly chart. For example, a chart beginning the week of Monday May 30th through Sunday June 5th would be submitted

with the monthly report for May and these values shall be used for the calculation of the weekly average flow rate for the last week in May.

The weekly injection pressure average includes all values that occur during the week, all "zero" startup values, and "zero" shutdown values, etc. The monthly injection pressure average will include all injection pressure values that occur during the month, including startups, shutdowns, and continuous injection values.

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ATTACHMENT D

SUMMARY OF SUBMITTAL DATES

The following is a summary of submittal dates for data required by this permit. This summary is provided to highlight some of the submittals required by this permit. The referenced condition must be consulted for complete details.

Condition	Submittal	Date Due
A 4	Change in Tubing and Packer	30 days prior to installation
A 9	Report providing information on mechanical gauges for the injection and verification wells	Within 30 days of issuance of the permit. (Log #UIC-143-M-3)
B 1(e)(iv)	Changes to the composition of annular fluid	Next Monthly Report
B 4(b)(v)	Changes to the composition of annular fluid	Next Monthly Report
B 4(g)	Verification Well Completion Report	Within 120 days of completion of the Verification Well
B 4(h)(v)	Annual Report on Westbay automated logging system	January 15 of each year
B 4(h)(viii)	Mechanical Integrity Testing	30 days prior to demonstration
B 4(h)(viii)	Mechanical Integrity Testing	24 hour notice due to unexpected events
B 4(h)(xii)	Gauge Calibration	January 15 of each year
B 4(i)	Installation of Second Verification Well	90 days prior to the planned installation
B 6	Well Completion Report	Within 120 days of completion of injection well
B 7	Monthly Operation Reports	15th each month (Quarterly data due with reports submitted by January 15, April 15, July 15 or October 15).
H 12(a)	Planned Changes	15 days prior to planned changes

Condition	Submittal	Due Date
H 13(c)	Corrective Action Requirements by Telephone	24 hours after the discovery
H 13(c)	Corrective Action Requirements by Letter	5 days after the discovery
H 14	Endangerment of Environment Oral Notification	Within 24 hours of time of endangerment
	by Letter	Within 5 days of endangerment
H 17(b)	Plugging and Abandonment Cost Estimates for Inflation	30 days after anniversary
H 22	Restriction of Injected Substances	January 15 of each year
H 23(d)	Certification of Plugging and Abandonment	60 days after plugging
H 24	Plans for Conversion	180 days prior to actual conversion
H 24	Notify before Conversion or Abandonment	45 days prior to conversion or abandonment
H 26(e)	Mechanical Integrity Testing	30 days prior to demonstration
H 26(e)	Mechanical Integrity Testing	24 hour notice due to unexpected events
H 26(i)	Gauge calibration	January 15 of each year
H 28	39i Certification	Within 30 days of any event described in Condition H 28

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ATTACHMENT E

WELL COMPLETION REPORT
(UIC Form 4h)

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT APPLICATION

FORM 4h - WELL COMPLETION REPORT

USEPA ID NUMBER _____
IEPA ID NUMBER _____
WELL NUMBER _____

I. Type of Permit
Individual: _____
Emergency _____
New _____
Renewal _____
Permit Number _____
Area: _____
Number of well _____
Name of Field _____
Emergency _____
New _____
Renewal _____
Permit Number _____

Location in Application

_____ II. Location, see instructions
_____ A. Township-Range-Section
_____ B. Latitude/Longitude
_____ C. Closest Municipality
_____ III. Surface Elevation
_____ IV. Well Depth
_____ V. Static Water Level
_____ VI. Demonstrated Fracturing Pressure, if applicable
_____ VII. Injection Well Completion
_____ VIII. Well schematic or other appropriate drawing of surface and subsurface construction details
_____ IX. Well Design and Construction
_____ A. Well hole diameters and corresponding depth intervals
_____ B. Annulus Protection System
_____ 1. Annular space, ID and OD
_____ 2. Type of annular fluid(s)
_____ 3. Specific gravity of annular fluid
_____ 4. Coefficient of annular fluid
_____ 5. Packer(s)

a. Setting depth
b. Type
c. Name and model

6. Description of fluid spotting frequency, type and quantity
7. Information on well driller used for construction of this well

X. Tests and Logs
A. During Drilling
B. During and after casing installation
C. Demonstrate mechanical integrity prior to operation
D. Copies of logs and tests listed above
E. Description of well stimulation

XI. Well Design and Construction
A. Casings, see instructions
1. Conductive casing
2. Surface casing
3. Intermediate casing(s)
4. Long string casing
5. Other casing
B. Injection Tubing, see instructions
1. Maximum allowable suspended weight based on joint strength
2. Weight of injection tubing string (axial load) in air
C. Cement, see instructions
1. Conductive casing
2. Surface casing(s)
3. Intermediate casing
4. Long string casing
5. Other casing

XII. Surface Facilities, see instructions
A. Filters(s)
B. Injection pump(s)

XIII. Hydrogeologic Information
A. Revised UIC Form 4a
B. Revised UIC Form 4d using actual data on injection formation
C. Revised UIC Form 4g
D. Copy of well completion report submitted to the Department of Natural Resources (Formerly Mines and Minerals)
E. Copy of any plugging affidavits on injection well filed with Department of Natural Resources

XIV. Injection Fluid Compatibility, see instructions
A. Compatibility with injection zones fluid
B. Compatibility with minerals in the injection zone
C. Compatibility with minerals in confining zone
D. Compatibility with injection well components

_____ 1. Injection tubing
_____ 2. Long string casing
_____ 3. Cement
_____ 4. Annular fluid
_____ 5. Packer(s)
_____ 6. Well head equipment
_____ 7. Holding tank(s) and flow lines
_____ E. Full description of compatibility of injection fluid with items A through D
_____ XV. Monitoring Program, see instructions
_____ A. Injection pressure gauge(s)
_____ B. Casing-tubing annular pressure gauge(s)
_____ C. Flow meter(s)
_____ D. pH recording device(s)
_____ E. Temperature

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

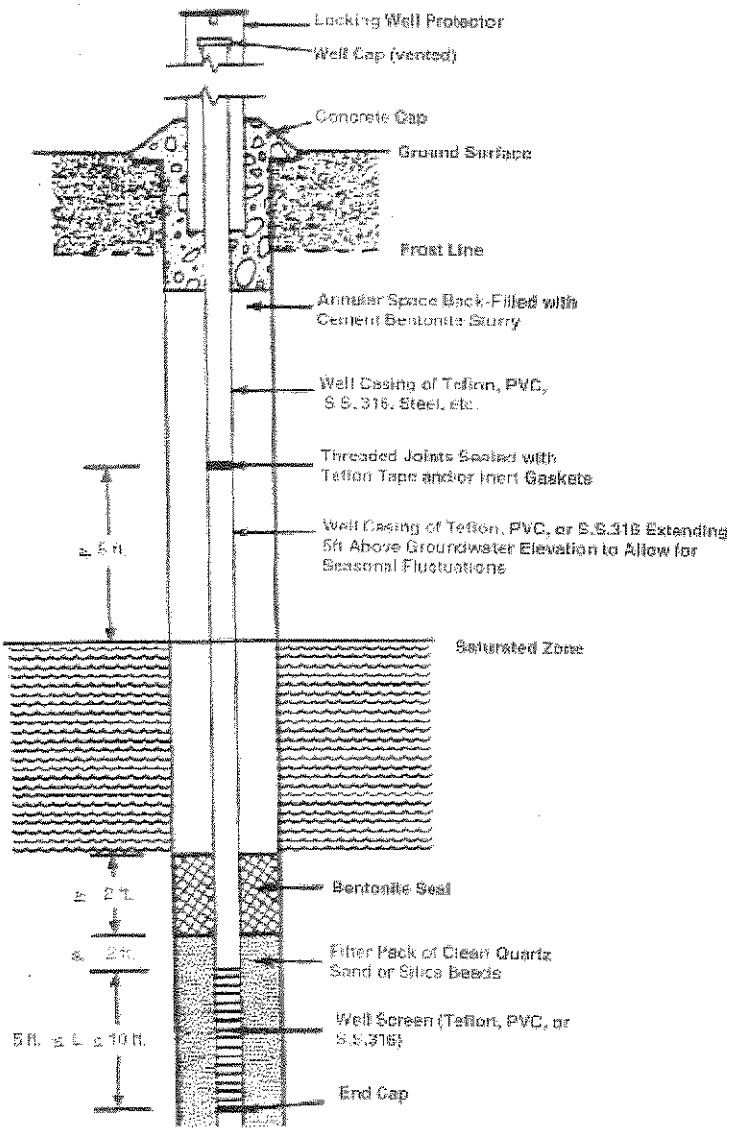
_____ _____
Name & Official Title Phone Number

_____ _____
Signature Date Signed

ATTACHMENT F

GROUNDWATER MONITORING WELL ATTACHMENTS

Monitoring Well Diagram



Illinois Environmental Protection Agency — **Well Completion Report**

Site Number: _____ County: _____

Site Name: _____ Well #: _____

State: _____

Plane Coordinate: X _____ Y _____ (or) Latitude: ° ' " Longitude: ° ' "

Borehole #: _____

Surveyed by: _____ IL Registration #: _____

Drilling Contractor: _____ Driller: _____

Consulting Firm: _____ Geologist: _____

Drilling Method: _____ Drilling Fluid (Type): _____

Logged By: _____ Date Started: _____ Date Finished: _____

Report Form Completed By: _____ Date: _____

ANNULAR SPACE DETAILS

Type of Surface Seal: _____

Type of Annular Sealant: _____

Installation Method: _____

Setting Time: _____

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: _____

Setting Time: _____

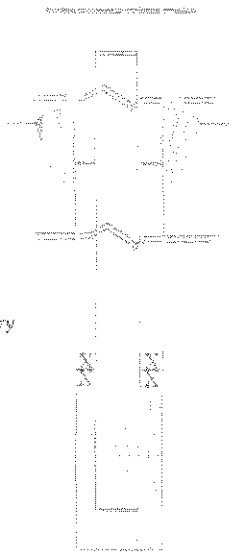
Type of Sand Pack: _____

Grain Size: _____ (Sieve Size)

Installation Method: _____

Type of Backfill Material: _____ (if applicable)

Installation Method: _____



Elevations (MSL)*	Depths (BGS)	(.01ft.)
_____	_____	Top of Protective Casing
_____	_____	Top of Riser Pipe
_____	_____	Ground Surface
_____	_____	Top of Annular Sealant
_____	_____	Static Water Level (After Completion)
_____	_____	Top of Seal
_____	_____	Top of Sand Pack
_____	_____	Top of Screen
_____	_____	Bottom of Screen
_____	_____	Bottom of Well
_____	_____	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing:	SS304, SS316, PVC, Other
Riser Pipe Above WL:	SS304, SS316, PVC, Other
Riser Pipe Below WL:	SS304, SS316, PVC, Other
Screen:	SS304, SS316, PVC, Other

CASING MEASURMENTS

Diameter of Borehole (inches)	
Riser Pipe (inches):	
Protective Casing Length (feet)	
Riser Pipe Length (feet)	
Bottom of Screen to End of Screw (feet)	
Screen Length (Slot to Slot) (feet)	
Total Length of Casing (feet)	
Screen Slot Size **	

** Hand-Slotted Well Screens are Unacceptable

Illinois Environmental Protection Agency

Field Boring Log

Page ____ of ____

State ID No. _____ Federal ID No. _____

Site Name: _____

Quadrangle _____ Sec. _____ T. _____ R. _____

UTM (or State Plane) Coord. N. (X) _____ E. (Y) _____

Latitude: ____ ____ ____ Longitude: ____ ____ ____

Boring Location: _____

Drilling Equipment: _____

County: _____

Boring No. _____ Monitoring Well No. _____

Surface Elevation: _____ Completion Depth: _____

Auger Depth: _____ Rotary Depth: _____

Date: Start: _____ Finish: _____

Elev.	Description of Material	Graphic Log	Depth In Feet	SAMPLES: Sample No.	Sample Type	Sample Recovery (%)	Pen. Resistance	N Value (Blows/6 inches)	OVA or (IN) Reading	Personnel: G - D - E - S -	REMARKS

ATTACHMENT G

ELECTRONIC GROUNDWATER SUBMITTAL

Formatting Requirements for the 01 Record of the Electronically Submitted Groundwater and Leachate Data (the 01 Record portion of the LPC-160 is included for example purposes)

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND POLLUTION CONTROL
CHEMICAL ANALYSIS FORM

Page 1 of _____

RECORD CODE: L P C S M 0 1 (1–6) TRANS CODE: A (7)

REPORT DUE DATE ___/___/___ (8–13) FEDERAL ID NUMBER _____

SITE INVENTORY NUMBER _____ (9–15) MONITOR POINT NUMBER (see Instructions) _____ (19–22)

REGION _____ CO. _____ DATE COLLECTED ___/___/___ ___ (23 M 25 D 27 Y 28)

FACILITY NAME _____

FOR IEPA USE ONLY

LAB _____ (29)

DATE RECEIVED ___/___/___ ___ (42 M 44 D 46 Y 47)

BACKGROUND SAMPLE (X) _____ (51) TIME COLLECTED (24 Hr. Clock) ___ ___ (55 H 57 M 58)

UNABLE TO COLLECT SAMPLE (see Instructions) _____ (59)

MONITOR POINT SAMPLED BY (see Instructions) _____ (60) _____ OTHER (SPECIFY)

SAMPLE FIELD FILTERED — INORGANICS (X) _____ (61) ORGANICS (X) _____ (62)

SAMPLE APPEARANCE _____ (63–192)

COLLECTOR COMMENTS _____ (193–142)

LAB COMMENTS _____ (195–199)

IL 532 1213
LPC 160 01/90

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 ½, Section 1004 and 1005. Disclosure of this information is required. Failure to do so may result in a civil penalty up to $25,000 for each day the failure continues a fine up to $10,000 and imprisonment up to one year. This form has been approved by the Forms Management Center.

All analytical procedures must be performed in accordance with the methods contained in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," SW-846, 2nd Edition, September 1986 or equivalent methods approved by the Agency. Proper sample chain of custody control and quality assurance/quality control procedures must be maintained in accordance with the facility sampling and analysis plan.

*Only Keypunch with Data in Columns 35 or Columns 38–47

KEY:

Spaces Numbered	Description	Format
Spaces 1-7	Record Code	LPCSM01
Space 8	Trans Code	A
Spaces 9-18	Site ID	0000000000
Spaces 19-22	Mon Pt ID	G000
Spaces 23-28	Date Collected	000000
Space 29	Lab	
Spaces 30-35	Filler	
Spaces 36-41	Report Due Date	000000
Spaces 42-47	Date Received	000000
Spaces 48-53	Filler 2	
Space 54	Background Sample	
Spaces 55-58	Time Collected	0000
Space 59	Unable to Collect Sample	
Space 60	Monitoring Point Sampled By	
Space 61	Field Filtered – Inorganic	
Space 62	Field Filtered – Organic	
Spaces 63-102	Sample Appearance	
Spaces 103-142	Collector Comments	
Spaces 143-149	Filler 3	
Spaces 150-199	Lab Comments	

Formatting Requirements for the 02 Record of the Electronically Submitted Groundwater and Leachate Data (the 02 Record portion of the LPC-160 is included for example purposes)

RECORD CODE | L | P | C | S | M | 0 | 2 | (1-7) TRANS CODE | A | (8) (COLUMNS 9-29 FROM ABOVE)

	FIELD MEASUREMENTS CONSTITUENT DESCRIPTION AND REQUIRED UNIT OF MEASURE	STORET NUMBER (30-34)	Remarks See Inst. (35)	Replicate (36)	< or > (37)	VALUE (38-47)
Q	TEMP OF WATER (unfiltered °F)	0 0 0 1 1				*
Q	SPEC COND (unfiltered umhos)	0 0 0 9 4				*
Q	pH (unfilted units)	0 0 4 0 0				*
Q	ELEV OF GW SURF (ft ref MSL)	7 1 9 9 3				*
Q	DEPTH OF WATER (ft below LS)	7 2 0 1 9				*
A	BTM WELL ELEV (ft ref MSL)	7 2 0 2 0				*
Q	DEPTH TO WATER FR MEA PT (ft)	7 2 1 0 9				*
						*
						*

IL 532 1213
LPC 160 01/90

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 ½, Section 1004 and 1021. Disclosure of this information is required. Failure to do so may result in a civil penalty up to $25,000 for each day the failure continues a fine up to $1,000.00 and imprisonment up to one year. This form has been approved by the Forms Management Center.

All analytical procedures must be performed in accordance with the methods contained in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," SW-846, 3rd Edition, September 1986 or equivalent methods approved by the Agency. Proper sample chain of custody control and quality assurance/quality control procedures must be maintained in accordance with the facility sampling and analysis plan.

***Only Keypunch with Data in Column 35 or Columns 38-47**

KEY:

Spaces Numbered	Description	Format
Spaces 1-7	Record Code	LPCSM02
Space 8	Trans Code	A
Spaces 9-18	Site ID	0000000000
Spaces 19-22	Mon Pt ID	
Spaces 23-28	Date Collected	
Space 29	Lab	
Spaces 30-34	STORET Number	
Space 35	Remarks	
Space 36	Replicate	
Space 37	< or >	
Space 38-47	Value	

ATTACHMENT H

PROCEDURE FOR WELL OR EQUIPMENT FAILURE

Attachment H

PROCEDURE FOR WELL OR EQUIPMENT FAILURE

A. Injection Well

1. Automatic shutdown of the injection system will occur if:
   a. Injection pressure at the wellhead exceeds 1,950 psig;
   b. annulus pressure drops below 400 psig;
   c. annulus pressure is less than pressure of the injection zone over the interval between the packer and the confining layer;
   d. injection of non-supercritical fluid occurs;*
   e. injection fluid temperature falls outside of the permitted range (60-150°F) as measured at the surface near the wellhead;*
   f. the injection rate exceeds 1,833 lbs/min for greater than 8 hours;
   g. the continuous electronic monitoring system is not functional;
   h. there is reason to believe that the mechanical integrity of the injection well has be compromised; or
   i. there is reason to believe that the integrity of the confining layer has been compromised.

   * Per permit Condition B.1(d) these limits do not apply during startup, testing and shutdown periods.

2. In the event an automatic shutdown is triggered, the owner or operator shall immediately investigate and identify the cause of the alarm or shutoff without undue delay. If, upon such investigation, the well appears to be lacking mechanical integrity, or if monitoring required under permit Condition B.2(b) and (d) otherwise indicates that the well may be lacking mechanical integrity, the owner or operator shall:

   a. Stop injecting fluids unless authorized by permit condition to continue or resume injection;
   b. Take all necessary steps to determine the presence or absence of a leak; and
   c. Notify the Illinois EPA within 24 hours after the alarm or shutdown.

3. In the event loss of mechanical integrity is discovered pursuant to Item A.1, above or during periodic mechanical integrity testing, the owner or operator shall:

   a. Immediately cease injection of fluids;
   b. Take all steps reasonably necessary to determine whether there may have been a release of injection fluids into any unauthorized zone;
   c. Notify the Illinois EPA within 24 hours after loss of mechanical integrity is discovered;
   d. Notify the Illinois EPA when injection can be expected to resume; and

e. Restore and demonstrate mechanical integrity pursuant to 35 Ill. Adm. Code 730.108 prior to resuming injection of waste fluids.

4. In the event of a failure of the continuous monitoring system injection shall cease and manual field readings shall be obtained from the gauges identified in Attachment I, "Field Log – Injection/Verification Wells", of this permit. The manual reading shall be recorded on the "Field Log – Injection/Verification Wells." The initial readings shall be obtained within 30 minutes of the failure and every four (4) hours afterword until the continuous monitoring system is restored. Copies of the log(s) and a report regarding the maintenance performed to correct the failure shall be provided with the monthly report as required in Condition B.7. Injection shall not resume until such time as all of the components of the continuous monitoring are operating properly.

B. Verification Well

1. Automatic shutdown of the injection system will occur if the following events occur at a Verification Well:
   a. pressure in the upper annulus pressure drops to -0.7 psig or is greater than 100 psig;
   b. pressure within the Westbay tubing string drops below -0.7 psig or is greater than 100 psig;
   c. an unexpected change in pressure occurs within the second QA zone up from the base of the confining layer; *
   d. the continuous electronic monitoring system is not functional;
   e. There is an unexplained drop in the fluid levels in the upper annulus of the Verification Well;
   f. There is an unexplained drop in the fluid levels within the Westbay tubing string of the Verification Well;
   g. there is reason to believe that the mechanical integrity of the injection well has be compromised; or
   h. there is reason to believe that the integrity of the confining layer has been compromised.

   * This limit does not apply during periods when the Westbay monitoring system has been removed for maintenance.

2. In the event an automatic shutdown is triggered by events identified in Item B.1, the owner or operator shall immediately investigate and identify the cause of the alarm or shutoff without undue delay. If, upon such investigation, the Verification Well appears to be lacking mechanical integrity, or if monitoring required under permit Condition B.4 otherwise indicates that the well may be lacking mechanical integrity, the owner or operator shall:

   a. Stop injecting fluids unless authorized by permit condition to continue or resume injection;

b. Take all necessary steps to determine the presence or absence of a leak; and
c. Notify the Illinois EPA within 24 hours after the alarm or shutdown.

3. In the event loss of mechanical integrity is discovered pursuant to Item B.1 above or during periodic mechanical integrity testing, the owner or operator shall:

   a. Immediately cease injection of fluids;
   b. Take all steps reasonably necessary to determine whether there may have been a release of injection fluids into any unauthorized zone;
   c. Notify the Illinois EPA within 24 hours after loss of mechanical integrity is discovered;
   d. Notify the Illinois EPA when injection can be expected to resume; and
   e. Restore and demonstrate mechanical integrity pursuant to 35 Ill. Adm. Code 730.108 prior to resuming injection of waste fluids.

4. In the event of a failure of the continuous monitoring system for the Verification Well injection shall cease and manual field readings shall be obtained from the gauges identified in Attachment I, "Field Log – Injection/Verification Wells", of this permit. The manual reading shall be recorded on the "Field Log – Injection/Verification Wells." The initial readings shall be obtained within 30 minutes of the failure and every four (4) hours afterword until the continuous monitoring system is restored. Copies of the log(s) and a report regarding the maintenance performed to correct the failure shall be provided with the monthly report as required in Condition B.7. Injection shall not resume until such time as all components of the continuous monitoring system are operating properly.

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ATTACHMENT I

FIELD LOG – INJECTION/VERIFICATION WELLS

FIELD LOG – INJECTION / VERIFICATION WELLS

(For back up field data collection in the event of power outage or other data transmission loss from automated gauges – see "*Instructions*")

Illinois EPA Site #1150155136 – Macon County Archer Daniels Midland – Corn Processing Carbon Sequestration Injection and Verification Wells	Permit No. UIC-012-ADM Well No. CCS-1 UIC Log # UIC-143-M-2

ADM Supervisor: _____

Readings Taken by: Name: _____

Phone: _____

Check Box(es) Above Failed Instrument(s) →						
DATE	TIME	Injection Wellhead Pressure PIT-009 (psig)	Injection Annulus Pressure PIT-014 (psig)	Verification Tubing Pressure Westbay (psig)	Verification Annulus Pressure Westbay (psig)	INITIALS

INSTRUCTIONS – Within 30 minutes of a communication loss, manual readings of the pressure in the tubing and annulus of both wells will be taken and recorded, and continued every 4 hours thereafter until communication is restored. Note that in the event of a communication loss, injection will cease.

ATTACHMENT J

APPROVED PERMIT APPLICATION

Document	Dated	Received
Initial Permit Application	01/31/2008	01/31/2008
Revised Initial Application (in entirety)	04/24/2008	04/28/2008
Revisions to 04/24/2008 application	06/20/2008	06/24/2008
Revisions to 04/24/2008 application	08/19/2008	08/21/2008
Revisions to 04/24/2008 application	12/19/2008	12/21/2008
Geophone Well Installation (Minor Modification - Log#: UIC-143-M-1)	08/05/2009	08/06/2009
Permit Modification Log#: UIC-143-M-2	10/30/2009	11/02/2010
Revised Modification Application (in entirety)	06/03/2010	06/04/2010
Revisions to 06/03/2010 application	11/12/2010	11/15/2010
Geophone Well closure cost estimate	01/05/2011	01/06/2011
Permit Modification Log#: UIC-143-M-3		
Geophone Well Completion Report	04/05/2010	04/06/2010
CCS1 Well Completion Report	05/05/2010	05/07/2010
CCS1 Well Completion Report Supp. 1	05/16/2011	05/18/2011
CCS1 Well Completions Report Supp. 2	07/08/2011	07/12/2011
Verification Well 1 Completion Report	08/01/2011	08/03/2011
CCS1 Well Completion Report Supp. 3	09/26/2011	09/28/2011
Monthly Reporting of Data, Weekly Averages	10/05/2011	10/07/2011
CCS1 Well Completion Report Supp. 4	10/18/2011	10/20/2011

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